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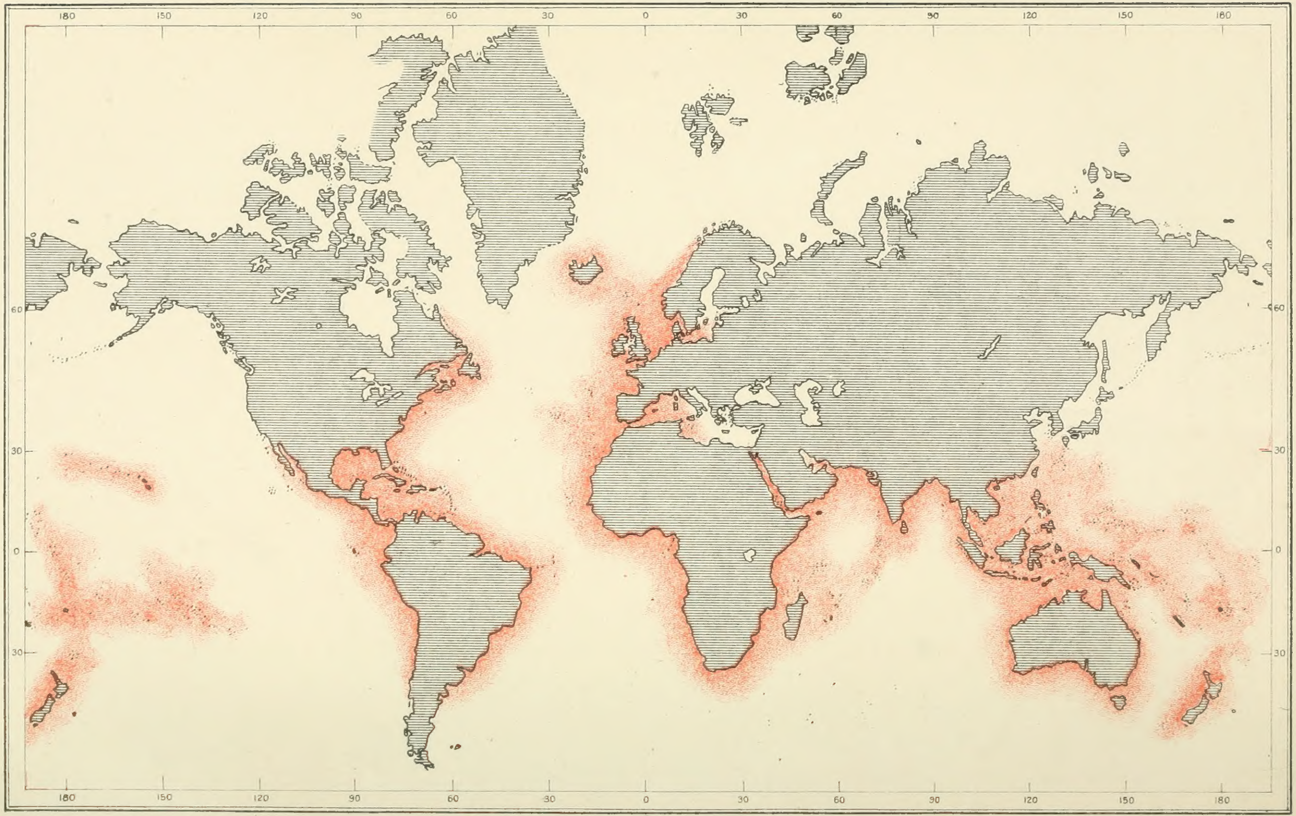
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THE GANNET

A BIRD WITH A HISTORY

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BY

J. H. GURNEY, F.Z.S.

Author of "A Catalogue of the Birds of Prey (Accipitres and Striges), with the number of Specimens in Norwich Museum."

ILLUSTRATED WITH NUMEROUS PHOTOGRAPHS, MAPS AND DRAWINGS, AND ONE COLOURED PLATE BY JOSEPH WOLF

WITHERBY & CO.
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1913

TO THE MEMORY OF
THE LATE
PROFESSOR ALFRED NEWTON
OF CAMBRIDGE
AND OF
MARTIN MARTIN
WHO WROTE ONE OF THE BEST ACCOUNTS OF THE GANNET
THE PRESENT CONTRIBUTION TO THIS
REMARKABLE BIRD'S HISTORY IS HERE INSCRIBED,
IN TESTIMONY OF THE VALUE WHICH THE
WRITINGS OF THESE TWO NATURALISTS HAVE BEEN TO
ONE OF THEIR SUCCESSORS.

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HISTORICAL PREFACE

The contribution which is now offered to zoological knowledge is neither a large nor an important one; moreover it is only about a single species—albeit a most remarkable bird—the Gannet, or Solan Goose (*Sula bassana* (Linn.)). It does not even pretend to be the final word about that species, concerning which there is more to be learned without doubt than we have discovered at present. The Gannet is a bird for which I have had a partiality ever since I was a boy, or rather since my first visit to Ailsa Craig — which was with a friend no longer living, forty-six years ago—and that to the famous Bass Rock, which was in 1876. Needless to say, I am far from believing myself to be the only person who has experienced this feeling, for so notable a bird cannot fail to have impressed many other ornithologists who have watched its stately flight. My interest in it which, as I said, began early was greatly augmented by reading two historical essays—one of them by Professor Fleming, referred to on p. 169 of the present work, and one by Professor Cunningham (" Ibis," 1866, p. 1), both of which are of great merit.

But apparently neither of these writers was aware of the admirable story of the Bass Gannets, told in " Historia Majoris Britanniæ " (1521) by one who was born near the Bass and whose narrative is quoted in full on pp. 173-6.

As enquiries were pushed further into Gannet lore, the more stimulating did they become, and they were helped by a brisk correspondence with the late Professor Alfred Newton, who was not only extraordinarily well versed in every ornithological topic, but singularly ready to impart information to those who knew less than himself.

Let us for a moment in imagination stand on the Bass Rock, where there have doubtless been Gannets for thousands of years, and where they have been seen by many naturalists oftener than I have seen them. Although there are not so many Gannets here as at St. Kilda, there is a vast number, yet the reader will hardly subscribe to Harvey's description of them on his visit in 1641, when he says that "like a cloud they darken the sun" (p. 199).

But certainly there have been moments in my own limited experience when I could say with Dunbar :—

"The air was dirkit with the foulis"

and these fowls were nearly all Gannets. Noble birds they were, sometimes passing in their wheeling flight near enough to permit of every motion of the feet and tail, which act like a rudder, being seen. Under these circumstances every undulation of those ponderous wings, which reach five and a half feet across and sometimes more, can be noted with ease. What a grand sight it is to watch one of these Gannets make its marvellous plunge, which I feel has been described very imperfectly in Chapter XV. Were it not so common a spectacle, there are many of its admirers who would be found to agree with William

Thompson in preferring it to the swoop of the Golden Eagle or the descent of the Peregrine Falcon on its quarry ("Natural History of Ireland," III., p. 257).

Not less remarkable is the great depth to which they can dive in the pursuit of fish (*see* p. 407), although here it is possible there have been exaggerations.

Then the details of their nidification are so curious, and the pertinacity very great with which they cling to their nesting stations; these are all on islands, and in number very few compared with those of other birds. How often has the now proved habit of its covering its egg with its webbed foot—first noticed in 1535 by a Dane (*see* p. 181)—been denied, yet this mode of incubation once thought so incredible, is in reality not more wonderful than the means which many other birds adopt.

Then again we mark their combativeness and thieving propensities, and take note of the long period of eight weeks during which the young remain practically helpless. Also there is the striking difference in colour between a young Gannet—which retains its black plumage for nearly a year—and an old one, which is white: a difference greater than obtains in almost any other bird.

It is with pleasure that we turn to the Gannet's anatomy, where a fine field for research lies open. The naturalist looks at the totipalmate feet, the aborted tongue, the lack of nostrils, the subcutaneous air-cells, the prolongated sternum, the junction of the carina and the absence of a brood-spot, and realises that he has before him a marvel of bird-life. Fortunately the osteology of the Gannet has had good investigators (*see* Chapter XXI.), but justice can hardly be said to have been done to its anatomy at present.

Again, no little antiquarian interest attaches to the Gannet, and this fact is brought vividly before the reader who dwells on the story of its early history at the Bass Rock, that mighty piece of Nature's handiwork. It was saleable as an article of food, its grease was thought to have medical properties, and was therefore valuable, and its feathers could be used for making beds. It is in a great measure to these combined circumstances, and especially to the value attached by our forefathers to its grease, which mixed with that of Badgers and Boars (*see* p. 466) could cure the gout, that we owe the allusions to it by so many early Scottish travellers and historians, for in the fifteenth century nobody thought much of a bird which had neither an edible nor a medical value, unless it was of use for sport. As for the Gannet, the Royal patronage of Scotland was accorded to it, so highly was it appraised; and the price charged for young ones from the Bass Rock was as much as two shillings a bird. All this is treated of in Chapter XIX.

The first book on birds worthy to be called an ornithological work which mentions the Gannet, is Turner's classic. "Marina avis est ex venatu piscium victitans," he writes. In these concise terms the Northumbrian author of the "Avium Praecipuarum" (1544) characterises a bird which he could hardly have seen alive, or he would not have said that in voice and aspect it recalled the Bernicle Goose. Next comes Turner's correspondent and friend, the illustrious Swiss physician Conrad Gesner, lost to Science by an early death at forty-nine. In the "Historia Animalium," of which Liber III., "de avium natura," was given to the world in 1555, Gesner puts the Gannet after the Geese, but the alphabetical arrangement generally adopted by him prevented anything like systematic grouping, and immediately after the Gannet follows the Great Bustard. Gesner repeats what Turner and Hector Boece the historian had said of the Bass or Scotch Goose, but he was evidently unacquainted with the passage which refers to these birds in Major's "Historia Majoris Britanniæ" mentioned above, which had been published some thirty-four years previously.

Scarcely less celebrated was the Fleming, de l'Escluse, better known as Carolus Clusius, whose account of the Gannet in the "Exoticorum Libri" (1605) has been referred to several times (*see* pp. 17, 30, 260), and it only needs to be remarked that in his figure, which was done from an American specimen, the convexity of the breast feathers is distinctly shown.

After Gesner, although the study of Ornithology was not at a standstill, there was nothing for a time written about the Gannet which could be called new. There is little that is worth quoting in the classical works of John Caius (1570), and Ulisse Aldrovandi (1599–1603), and some later authors were content, for want of first-hand knowledge, to copy from one another. Neither have I thought it necessary to quote from Sir Robert Sibbald's two works, published in 1684 and 1710 (referred to on p. 30), in both of which he seems to have helped himself freely from the MS. which John Blaeu had used in 1654.

But, fortunately, there are journals preserved to us, which contain items of value about the Gannet, or " Sey guse," as it has been called, and the memoranda left in these by such travellers as Sir William Brereton (1634) and by such men of science as Bishop Leslie (1578), Harvey (1651), and Ray (1661), tell us much which we should never have known without them. Besides the mention of the Gannet by Ray in his "Itineraries," namely, when he met with it off Godreve [Godrevy] Island in 1662 (*see* p. 387), as he had done the year before at the Bass Rock (p. 205), he and Willughby twice described it in their "Ornithologiae Libri Tres" (1676), a work which would have been lost to science but for Ray—or Wray, as he at one time wrote his name—and which has since proved a fertile source of information to many subsequent writers. The second of these descriptions, however, which is taken from a bird sent to one of the authors by Dr. Walter Needham ("Ornithologia," p. 265, English edition, p. 348), was evidently not from a Gannet at all, but apparently was drawn up from a Great Skua (*Megalestris catarrhactes*). Here Ray drifts into a further mistake by not realising that the Cornish Gannet which he and Willughby had seen off Godrevy in Cornwall, and the Solan Goose of Scotland were one and the same bird. It was an excusable error, but it brought on him the censure of Walter Moyle ("Works," 1726, I., p. 424), and a milder rebuke from Thomas Pennant ("British Zoology," II., p. 617). Further back, in their joint "Ornithology," we find a quoted description of "The Sula of Hoier," which, though Ray felt doubtful about it ("Ornithology," p. 331), was in this instance taken from an unmistakeable Gannet not quite adult.

Finally, we come to the best told story of all—save for some exaggeration in regard to numbers—Martin Martin's "A Late Voyage to St. Kilda," an island then almost unknown, where the Gannet was a staple article of food. The five or six-times reprinted narrative of this expedition, which was in 1697, ought to have made many English readers familiar with the name of Solan Goose, but it does not seem to have done so. That the discoveries, for such they may be termed, of Martin, who was a native of the Island of Skye (*see* p. 118), should be unknown to foreign scientists like the illustrious Buffon (1770-83) is not surprising, but that our own countrymen, Latham, Montagu, Selby, Macgillivray, Yarrell, and Saunders should pass them unnoticed is very singular.

In John Walker's "Essays on Natural History" (1808) there are some good notes which, like the observations of Martin, have been overlooked by English writers, if not by his own countrymen. Passing over Pennant's "British Zoology" (1766 and 1768), and a few allusions in the same author's "Tour in Scotland" (1771), to Gannets, there is nothing which calls for remark in Latham's "Synopsis" (Vol. III. 1785, Supplement 1787), or in the same author's "General History of Birds" 1821-8 ; but to George Montagu belongs the credit of describing the Gannet's remarkable subcutaneous air-cells ("Supplement to The Ornithological Dictionary," 1813). Strange to say, although a Devonshire man, he did not know of the existence of the Gannetry on Lundy Island ; but he lived in South Devon, which more than serves to excuse him. In "The Gentleman's Magazine" for 1815 (Pt. II., p. 281) it is stated that more MSS. were in preparation at the time of Montagu's death, and these might contain something about Lundy and its Gannets, did we now possess them. Noteworthy for its vividness of description is the journal of John J. Audubon (1833), and not less meritorious are the posthumous notes of the St. Kilda minister Mackenzie (1841), to say nothing of the narratives of William Thompson (1851), Professor Macgillivray (1852), Henry Bryant (1860), Cunningham (1866), Booth (1883), F. M. Chapman (1900), and J. Wiglesworth (1903), and the returns made to Dr. Harvie-Brown by the Scotch lighthouse keepers. On page 13 an imperfect attempt has been made to enumerate the books which treat of the Gannet, but it would take too long to give a complete bibliography.

The Latin nomenclature of the Gannet is fairly simple. Starting with the great reformer of Natural History, we find the Gannet wanting in the 9th and preceding editions of the "Systema Naturæ," but included in the 10th and 12th (1758 and 1766)—the latter being the last published under Linnæus's own supervision--in the genus *Pelecanus* where the few species known to Linnæus follow the Cormorants. In the 12th and 13th editions the great Swede gives (*l.c.*, p. 217) a short but precise description of his *Pelecanus bassanus*, and adds: "Habitat in Pelago Septentrionali, vix., appropinquans littora per 2 miliaria; indicat Halecum adventum, quem sequitur. Gentleman s Jaen von [? van] Gent dicta." The name of "Gentleman" Linnæus probably took from Debes and that of "Jaen van Gent" from

Frederick Marten's "Spitzbergen" (1675, p. 97). He then goes on to say that the Gannet is found "Insula Scotiæ Basse," and quotes a part of Harvey's description, which I have given (p. 198).

The first naturalist to endow the Gannet with a generic name—*Sula*—was Mathurin Brisson, who, in Newton's "Dictionary of Birds" (*cf.* Introduction, p. 9), is highly praised for the work he did. Scrupulously exact in differentiating species, whether in French or Latin, he at once saw the radical differences between the Gannet and the Pelican. The fruits of all his industry was an "Ornithologia," produced in 1760, the Latin portion of which was reprinted in 1763, and here we find the Gannet concisely described as "*Sula candida; remigibus primaribus fuscis; retricibus candidis . . . Sula Bassana*," after the island with which it was generally associated.

Commencing with Brisson the scientific synonymy of the Gannet is set forth in the present work on page 17, but it is to be found given in greater detail in the 26th volume of the "Catalogue of the Birds in the British Museum" (1898) by Mr. Ogilvie-Grant, where also a great number of valuable references are added which it would occupy too much space to repeat here.

The vernacular names of this bird are less important, but they are given in different languages, mostly expressive of the Gannet's habits, *e.g.* Harenguier (French) = Herring-fisher, and Mascato (Portuguese) = Plunger; they will be found enumerated on p. 18. There is also another list of them in Dresser's "Birds of Europe" (Vol. VI., p. 181). There is one vernacular appellation which has been a complete puzzle, that of Malagash, commonly applied to the South African Gannet (*see* p. 544). In the "New English Dictionary" this is given as meaning a native of Madagascar, but *Sula capensis* is very rare in Madagascar, and is not known to breed there. Malagash is a name which is in universal use in Cape Colony, and as Mr. William Sclater has pointed out it is one possessed of considerable antiquity, being found in Peter Kolbe's "Caput Bonæ Spei Hodiernum" (1719, p. 181).

As regards its English name, the Gannet was generally termed a Solan Goose in common parlance in the British Isles, although Selby (1825-33) called it the Solan Gannet, in which he was followed by Macgillivray in his "Manual" (1846); but that appellation is unusual. Solan Goose is the name employed by Thomas Pennant in four editions of his "British Zoology," a book which was so popular that six editions were called for, and in which there is a good account of the Gannet (8vo ed., 1776, II., p. 612), and a picture by George Edwards of the bird in the act of plunging. In the fifth edition (1812), however, Mr. W. H. Mullens informs me the name is changed to Gannet Corvorant.

The many ways in which Solan has been spelled have been commented upon (p. 26), and the conclusions of Professor Skeat quoted. It should be pointed out, however, that Solamosse geese in the "Household Books of Naworth Castle" (p. 196) may have been tame Geese sent from Solway Moss, and not Gannets (H. S. Gladstone in "Scottish Naturalist" 1912, p. 90). If not a copyist's error, the word is misleading (*cf.* "Ann. Scot. N. H."

1911, p. 76). For more information as to the etymology of the word Solan, *see* Skeat's "Concise Etymological Dictionary of the English Language" (1901) and the Oxford "English [Murray's] Dictionary" (1913), for an advance copy of which (*art.* Solan) I am indebted to Mr. W. A. Craigie. Probably the earliest use of "Solan" is to be met with in the "Cupar Codex" (*i.e.*, *cir.* 1447) by Abbot Bower (*see* p. 171), and about the same time the word occurs in the "Buke of the Howlat [*i.e.*, Owlet]," by Sir R. Holland (*see* p. 27), a curious poem which brings in the names of birds. Earlier than this no instance has been met with, but the word Solan is probably much older than the fifteenth century.

In the Færöes "Sule" has been a household word ever since a certain sorcerer lived who, it is affirmed, presented this valuable bird to the inhabitants of Myggenäes ! ! * Some of these legends are of great antiquity, and this one may be of the fifteenth century; in Iceland the name Sula goes back as far as that (*see* p. 271).

In Norway Sule or Sula is also a name of considerable standing. I learnt from the late Professor Collett that Sula is used in Ign. Ramus's "Norviges Beskrivelse" (1715), and in 1753 we again meet with "Hav-Sule" in Erich Pontoppidan's "Norviges Natural Historie." In Denmark the Gannet is also known as the "Havsula."

A word of explanation seems necessary as to why I have thought it best to adhere to the name of Gannet in preference to Solan Goose throughout this book. It has been employed as being the name most familiar to Englishmen and also as the one selected by Professor Newton, whom it is generally safe to follow; but Solan Goose is strictly correct, and is an appellation by which this bird has long been widely known in Scotland.

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* "The Islands and Inhabitants of Foeroe," by L. Jacobron Debes, 1673, englished by J. S[terpin] 1676 (p. 183).

Gannet we are prone to look upon as a book-name; but it is much more than that, being a name of great antiquity since it was used by the Saxon chroniclers. With regard to its signification, perhaps enough has been said on pp. 22, 23, 24; and as to the spelling of the word, the Oxford "English [Murray's] Dictionary" (1901), gives the following forms:—GANNET (gæ′ne′t). Forms: ganot, ganate—ette, gannett (gannard), ganet, gannet, gante, gaunt, gaunte, gant. The Dictionary states the Old English *ganot* to be cognate with the Dutch *gent*: Middle High German *ganiz, genz:* Old Teutonic types *ganito, ganoto.* I have quoted what Professor Skeat says about it (p. 22), but a few additional remarks may not be out of place. Writing from Cambridge in 1908, he says: "There is not the faintest pretence for alleging doubt as to the etymology of the *gan*—in *gan-der*, *gan-net*, *gan-s*, it is obviously = ghan, in the Greek χαν, — to gape, which as Prellwite explains in his "Etymological Greek Dictionary," admits of the suffix — γειν or — ιειν; and by usual Greek laws, the original form χάν — ιειν becomes χαίνειν regularly; as ανι passes into — αιν —. The base — χαν — has a variant with *long* α. This gives χᾱν, which is the old *Doric* form of the Attic χήν, a goose." Tame geese do open their mouths a great deal and Gannets still more so, gaping when they cry, or for food, or sometimes for no obvious reason at all; the bird that opens its mouth, is rather an applicable description of Geese and Gannets than otherwise.

Chapter XVII. treats of a very obscure subject, namely the great mortality which there certainly is among Gannets, not of nestling Gannets, a few of which no doubt die in their nests from sunstroke and lack of food, but of rather older birds. The greatest number of deaths appears to take place among the Gannets when they are in the speckled black plumage of their immaturity, and there can be little question that this mortality goes on almost entirely between the ages of two months and six months. During that period, there is an interval of four or five weeks when young Gannets get little or no fish-food, and it may be that, being left to provide for themselves, many subsequently die from the effects of this enforced fast. Possibly the death-rate is equally high among the young of other birds, either about this time, or at some younger age. It is not to be supposed that the Gannet is singular in this respect and other sea-birds—*e.g.* Cormorants and Guillemots—immune. If one reflects about the matter, there must be a measure of mortality dealt out to all species, for if the majority of young birds did not die, the species would in every case increase too fast. Take the House-Sparrow (*Passer domesticus*) for instance: England would be over-run with them, if they all came to maturity!

Dr. P. Chalmers Mitchell, in a paper to be referred to later on, takes this common bird for an example, remarking that: "If every pair of sparrows alive in London at the beginning of the breeding season displayed maximum fertility, a death-rate of about 90 per cent. per annum would be necessary to keep the sparrow population stationary" ("Proceedings of the Zoological Society," 1911, p. 426). This is no exaggeration of the case, and what applies to the House-Sparrow applies in a less measure to the Gannet. Charles Darwin has touched on this subject with his usual perspicuity: "Every organic being," he says, "naturally increases at so high a rate, that if not destroyed, the earth would soon be covered by the progeny of a single pair." ("The Origin of Species," 1st ed., p. 64). *See also* his illustration of this proposition in the case of that familiar household bird, the Robin, in "Foundations of The Origin of Species" (p. 89).

Connected with the question of Gannet mortality, although in no way explanatory of it, is that of the average age to which Gannets live, and this is a matter in which the more we can get away from the region of guess-work, the more chance there is of arriving at something definite about a subject which has baffled scientists from the days of Lord Bacon. Some very imperfect remarks have been made about it in Chapter XVIII., to which I need not again refer. In this connection there is one point which has to be remembered, Gannets are very liable to accidents, even after they have passed the first six critical months, as has been shown in Chapter XVII. The percentage of Gannets which grows up, attains maturity and ultimately dies a natural death, must be exceedingly small; I doubt its being one per cent.; but then it may well be that this one Gannet reaches a very advanced age—-one, two, or three hundred years ! This has been justly spoken of by authors as the potential longevity of a species, which is a very different thing from the average length of a bird's life. A Gannet which has escaped all dangers for a hundred years is an exemplification of potential longevity ; it has, as Dr. Chalmers Mitchell puts it, been fortunate enough to go through life in an environment relatively ideal. Such birds can have little or no effect on the good of their species, the welfare of which is governed by, and dependant upon, the average age to which its members attain.

Let us consider what knowledge we possess in this matter, albeit it is assumption with which we have to be content, rather than actual knowledge. To begin with, we are surely justified in assuming that where there is a heavy mortality among the young of a species, as is evidently the case with the Gannet, we may look for long duration of life.

This would have to be so in order to ensure replacement of the parent Gannets by successfully-reared young ones.

August Weismann held that the duration of a bird's life was determined by the length or shortness of the period needed to rear enough offspring to perpetuate the race (" Ueber das Dauer des Lebens," 1881 ; translation " Essays upon Heredity," 1889), yet on the other hand there must not be too many young reared, to maintain about the same numerical level year by year.

There are at least six other reasons for holding the Gannet to be a bird which can live for many years.

First we have the long standing legend at the Bass Rock that Gannets habitually attain to a great age (pp. 176, 451-2), a legend which we may be sure has not held its own for four hundred years without a measure of truth in it.

Secondly it has been argued that an inert and sluggish bird lives longer than one which is active, because there must be less waste in its organism; this does not seem an unreasonable proposition, and accordingly the Gannet, which is a sluggish bird, should be long-lived if this holds good.

Thirdly, long brood-care has been thought to stretch out the duration of life, and here again the Gannet scores. It has also been reasonably suggested that where the period of growth is long (seventy days in the Gannet), that in itself may imply long duration of a bird's life.

It has likewise been argued that birds which lay only one egg must of necessity live longer than those which lay a great many. The Partridge, for example, begins to lay at one year old and deposits fourteen eggs, whereas the Gannet begins to lay at three years, and deposits only one egg; the Gannet therefore should be much the longer-lived bird of the two.

Again, a Gannet is a very hardy bird, exceedingly well clad with close-fitting thick feathers adapted to the elements in which it lives. It is not exposed to much frost, because frosts are not intense at sea, and no wind or rain seems to hurt it, so long as enough food is obtainable.

Yet another reason why Gannets should be long-lived is urged by August Weismann in his treatise on the Duration of Life, but it can hardly be admitted as a tenable one. Knowing that a great many Gannets are bred at St. Kilda, and that the young were formerly killed there in large numbers for food—four thousand or more in a year—he infers therefrom that if the Gannet had not been a long-lived species, the stock must have declined. As a matter of fact the number of young Gannets killed there probably never greatly exceeded the number of young which survived, so the argument hardly holds. For the same reason the argument cannot be satisfactorily applied either to the Fulmar Petrel or the Puffin.

When the eighteenth chapter of this book was written, I had not had the advantage of reading the treatise by Dr. Chalmers Mitchell, already alluded to, " On Longevity and Relative Viability in Mammals and Birds " (" Proc. Zool. Soc.," 1911, p. 425)—a treatise which brings together records of the duration of bird-life, including Gannets and other marine species. As regards the Gannets, the particulars given (pp. 506, 536) are on the whole disappointing. No case is recorded by Dr. Mitchell of *Sula bassana* and *S. serrator* having exceeeded a year and a half in captivity, but this is even a less time than *S. bassana* has lived on my small pond; however *S. leucogastra* (Bodd), the Brown Booby, was kept for three years and four months by the Zoological Society. But Gannets, like Pelicans, can evidently live much longer than this—of that we have in the case of the former fairly conclusive proof.

Besides the evidence which has been already adduced in Chapter XVIII. we have P. J. Selby's definite statement that individual Gannets had been recognised at the Bass for forty years (" British Ornithology," II., p. 458), a statement which in passing I may remark is misquoted by Morris in his " British Birds " (VI., p. 81), and by Dr. Richardson, copying from him, in the "Guide to North Berwick." Selby also says that Patrick Neill, the botanist, kept a Gannet for many years in confinement at Edinburgh.

Altogether a hundred and sixty five examples are given in Dr. Mitchell's paper to illustrate the average length of life of the *Steganopodes* in captivity, and Dr. Mitchell feels himself justified in concluding that they are a group possessed of great longevity and viability, especially the Pelicans. In another place he also says, " there seems no constitutional reason to assign a low viability to Gannets and Cormorants " (*t.c.*, p. 536), and such evidence as we have fully justifies this supposition.

Following in the steps of Weismann, Dr. Mitchell first discusses the question whether there is, or is not, any correlation between longevity and the size of animals. Here, if there was any, the Gannet would have an advantage but Dr. Mitchell is forced to conclude that among Birds, at any rate, this is a theory only at present, and one which must not be pressed too far until we know more about it. Weismann, however, believed in some relation of the kind. Duration of life is dependant upon adaptation to external conditions. That is the way in which Weismann puts it, and its length whether longer or shorter is governed by the needs of the species, and this sums up the matter as far as our knowledge at present takes us. It may not be to the advantage of the Gannet, as a species, that individuals should live too long, old age would be accompanied by weakness, and that species ought to be the most successful which has in its ranks the most vigorous adults. As soon as a Gannet ceases to produce offspring, or only begets weakly ones, it is for the good of the race that it should perish, for the reproduction of its kind is the aim and purpose of every animal's life. In every settlement of Gannets there are said to be a certain number of these old and barren birds which live apart.

It is hardly to be expected that one writer could do justice to such an extraordinary bird as the Gannet single-handed, and I have had help on all hands, for which I am very grateful. In particular my Father's valued friend, and my most kind correspondent, the late Professor Alfred Newton—a Suffolk man, although best known as of Cambridge—rendered invaluable assistance during the last four years of his life, which terminated at the age of seventy-eight, to the regret of zoologists of every nation, on June 7th, 1907. I am glad to say I was privileged to be one of those who paid a final tribute of respect to his memory on June 10th, in St. Giles's Church, Cambridge. By a coincidence the 7th was the day on which the bicentenary of the birth of the great reformer of Natural History, Linnæus was being celebrated, a man whom in his devotion to natural science, as well as in his methodical habits of registering Natural History observations, it may be truly said that Newton from an early age not a little resembled, in proof of which I need only point to the elaborate ornithological "Register-book" kept by him and his brother at Elveden ("Norwich Naturalists' Trans:" 1870-1, pp. 24-32). It has been well said of Alfred Newton that he held a unique position among zoologists in this country. This was so, and there are many who can testify to the literary help which he was always ready to give. In the furtherance of our Gannet researches, his liberality in lending books and pamphlets from his well-stocked shelves—one of the best bird-reference libraries ever brought together—was as great as his readiness to translate passages from Icelandic and Latin authors, which bore upon the Gannet's history. I owe him all the more thanks because he was at the time when I applied to him for assistance with this Gannet book, busily putting together materials, which it had taken him years to collect, for a History of the Great Auk, seven eggs of which extinct bird he bequeathed to the University Museum at Cambridge.

On turning over the many letters which, though busy to the last, he found time to write, I see that the final one —received on May 6th, 1907, less than a month before his death—has reference to the Gannetries in Canada. As it is an interesting letter, and his last, I hope it will be no breach of confidence to transcribe a part of it: after expressing regret at the loss of one of the unpinioned Gannets on my pond, which had taken advantage of a gale of wind to fly away, he continues, in answer to a question about his eggs:—

". . . My series of Gannets' eggs is certainly good, but it is not what it ought to be, for Stack of Stack and Skerry is not represented, and one does not know from which of the three stations in the St. Kilda group the specimens so marked came—Borreray, Stack-Lii, or Stack-an-Armin, but probably the first as being the most accessible. There must be a good many specimens about from Stack of Stack and Skerry . . . in his later years, the younger Dunn (Joseph) used to go there every season, but neither H—— B—— nor W. E. C—— was able to find me one. It is to you that I owe the Irish specimens and I am very lucky to get any from Eldey. I cannot make out exactly how many American stations there are left—the destruction of birds in the Gulf of St. Lawrence and both coasts of Labrador seems to have been more desperately cruel and useless than anywhere else in the world. I have been lately working out a good many of the old voyages into these parts—my object of course has been the 'Penguin'—but one does meet with the Margaulx (Gannet) also—though how many stations it has I cannot make out."

The slaughter meted out to the unfortunate Gannets and other sea-birds, in the Gulf of St. Lawrence was a topic which had fired his indignation before, and been condemned in previous correspondence, *see also* his allusion in the "Dictionary of Birds" (p. 301) to what he calls "the brutality of the fishermen." Nor will this attitude surprise any one who knew Professor Newton, for in truth he was constantly in the lists fighting in the cause of Bird-protection.

What this destruction was eighty years ago may be judged from the particulars obtained by Audubon, when he visited the celebrated Bird-Rocks in 1833. He found that the Labrador fishermen were in the habit of regularly visiting this great resort of Gannets to procure their flesh for bait, armed with short clubs for the purpose of killing them. The frightened birds, prevented from rising into the air by their long wings, impeded each other's progress, by which numbers were overtaken and forced to the ground, the men beating and killing old and young with their clubs until too fatigued to go on any longer. Audubon's pilot, who had been to the Gannet Rock ten seasons in succession, had seen six men destroy five hundred and forty Gannets in about an hour by clubbing them, after which the party rested awhile. So great was the massacre of Gannets which went on upon this island of destruction, that their flesh supplied upwards of forty boats, which annually came to Brion Island for the cod-fishing, with bait. For these facts *see* Audubon's "Journals" published by his daughter and Elliott Coues in 1898, and the "Ornithological Biography" (Vol. IV., p. 224). Other species of birds were doubtless killed as well, but the Gannets which nested on the flat upper surface of the Bird-Rocks were the easiest to capture, next to the flightless Gare-Fowl which had supplied Hakluyt's voyagers in the sixteenth century, but were now become rare. Gannets also bred on Funk Island, which is further north, and here, says George Cartwright, "It has been customary of late years for several crews of men to live all summer on that island, for the sole purpose of killing birds for their feathers; the destruction which they have made is incredible." (". . . The Coast of Labrador," 1785, III., p. 55). But here the Great Auk was the chief sufferer. In 1874, Funk Island was visited by Professor John Milne, and in July, 1887, by Mr. F. A.

Lucas, who has left a full account of what he saw. The latter says: "After the extermination of the Great Auk, the fishermen and eggers seem to have done their best to extirpate the remaining denizens of this isolated spot, and it may well be that the Gannets were as effectually annihilated as the unfortunate Garefowl." ("The Auk," 1888, p. 135.) Neither did they fare much better on Bonaventure (*see* p. 308).

But for Professor Newton a similar destruction might have overtaken the Gannets in Scotland, as a sequel to the injudicious report issued in 1878, by the Scottish Herring-fishery Commissioners. The conclusions of the Commissioners have been dealt with elsewhere (pp. 6-11), but the Report might have done incalculable harm. As it happened a letter which Newton addressed to "The Times" newspaper, saved the situation. This letter which was afterwards reprinted by the Close-Time Committee, with the signature of their acting secretary Mr. Dresser, had sufficient weight with our legislators to save the country the committal of an act of great folly, and the Gannets on our shores were saved.

I hope they may never again have need of such advocacy, nevertheless the question of whether Sea-birds lessen the supply of fish which man needs for his own consumption will come up from time to time, and there is but one valid answer to it. The answer is that herrings, mackerel, whiting, etc., are innumerable; moreover their fecundity is almost immeasurable: in a word, there are and probably always will be fish enough for man and the birds too. In 1881, Professor Huxley wrote: "I do not believe that all the herring fleets taken together destroy 5 per cent. of the total number of herrings in the sea in any year . . . " and in another place he says: " . . . there is not a particle of evidence that anything man does [such as destroying Sea-birds] has an appreciable influence on the stock of herrings" ("Scientific Memoirs," IV., p. 553); and here we have the dictum of a great authority. Allusion has already been made to the prodigious number of herrings caught in the North Sea between 1902 and 1907, and there has been no abatement. In 1912 the number landed at Yarmouth and Lowestoft beat all records, over thirteen hundred and sixty-one million being brought into these two ports alone. (*See* T. J. Wigg, "Zoologist," 1913, p. 72, and "The Fish Trades Gazette" of December 12th, 1912.)

Besides the services already mentioned, Professor Newton was at no small pains in helping to unearth the present whereabouts of the documents relating to the Gannets on Lundy Island, in the Bristol Channel. These have been given in Chapter III., but as they are of pre-eminent interest, it may not be out of place to say a few more words about them before closing. These "Inquisitions" or inventories as we should call them now, were ordered to be made when the island escheated to the Crown in the reign of Edward I., and again when Herbert de Marisco "recovered it" from de Wyllyngton. At that time the island was evidently well cultivated: to say nothing of the Gannets and other edible birds, there were upon it twenty acres of arable land, besides five acres of good meadow, and grazing for cattle. In time the "Inquisitions" were put aside, and having no value as conveyances of land became buried among the Archives of the State, until an industrious antiquary, Mr. F. D. Hardy, dug them up and communicated them to "Collectanea Topographica," which is the only work in which they have been printed.

The search for the originals, which Professor Newton thought it highly desirable should be re-examined, gave a good deal of trouble, until Dr. Birch suggested my applying at the Record Office, in Chancery Lane, where they were soon run to ground. It was worth the labour, although there was nothing more about Gannets than Hardy and Steinman had given us.

Here we have the oldest record of any bird's breeding-place in the British Isles, with the exception of sundry eyries of the Peregrine Falcon specified in Domesday Book which was completed in 1086. There are also, it is true, Heronries of great antiquity, but none—not even Chilham in Kent, or Wormegay in Norfolk ("Norw. N. Tr.," VI., p. 159)—can show such a pedigree as the Lundy Gannets. 1274 is indeed a long way back. Even at that time it is to be inferred that the Gannets on "petra ganetorum"—the isolated rock at the north-east end of the island—were not very numerous, as their value was only reckoned by the assessor as equal to a hundred rabbit-skins. Evidently the "butcher falcons" were thought more of, and indeed Lundy Peregrines are still famed for their courage and splendid qualities (*cf.* "Field," 1891, p. 715).

Some forty-seven years later, however, the Gannets had risen in value, and in spite of marauding Scots, they had extended their breeding-ground to two places on the cliffs.

A third inventory in 1325 again tells us of the—

> "fowles which Alexander Necham calleth Ganimedes birdes having great nestes,"

and after that we are left for a long time without further knowledge of them.

In his "Lundy Island"—a book which has neither date nor index, but which appears to be an extension of a paper communicated to The Devonshire Association in 1875, and which at any rate from internal evidence was published after 1871—the late Mr. John Roberts Chanter states (p. 138), that Gannets are *continually referred to* in the old records of Lundy but he only cites the same instances which Steinman gives. I have in vain searched the Rolls series of State Papers, but it seems quite likely that other references exist, even if Mr. Chanter did not know of them.

It is sad to think that Lundy Island, with its old associations, which is—or rather was—the most southern of the Gannet's Old World breeding-places, is now forsaken.

This breeding station was unknown to writers on British birds before Yarrell (1839), who doubtless took his information from Edward Moore (*Mag. Nat. Hist.*, 1837, p. 364).

Lundy Island has had a long and romantic history, but it has been a history of freebooters, and outlaws, in which birds, although its very name is derived from one of them, have no part, and Gannets attracted but little attention. What can be gleaned of their modern history has been already told in chapter III., but it goes no further back than 1830. At this time there were still sixteen nests (p. 48), but things soon went from bad to worse, and 1882 is supposed to have been the last summer in which any were bred. In August, 1887, Mr. Howard Saunders, who was staying on the Island, was still able to write: "Lundy is much as it was; more Gannets but their eggs are all taken, and not one hatched, this cannot be helped as they nest in such an accessible place from the water as well as the land . . . " (*in litt.*). 1903 seems to have been the last year in which any eggs were laid. Although we have lost the Gannets from Lundy Island, everyone will be glad to know that the parchment Inquisitions, which shed such an interesting light on their early history, are safe, and both of them in excellent preservation. By the courtesy of the officials at the Record Office, Mr. H. F. Witherby has secured an admirable photograph of the earlier of the two, reproduced to face page 48.

It was hoped that something similar might turn up about the Gannets on the Bass Rock, but Mr. John Anderson, who has very kindly made search among the writs and bulls in the General Register House at Edinburgh, has failed in discovering anything relating to the Bass earlier than 1493, so its Gannetry cannot compete with Lundy, although it may be older in reality.

Other correspondents who have been good enough to take an interest in the Gannet book, and to assist, are the distinguished Scottish naturalists, Mr. W. Eagle Clarke, of the Royal Scottish Museum, Mr. J. A. Harvie-Brown, LL.D., and Mr. John Paterson of Glasgow, who have at much labour to themselves, criticised and been through the proofs. Mr. Harvie-Brown has also obliged me with a number of notes on Gannets from "The Scotsman" newspaper, by Mr. J. M. Campbell and others, which I hope may one day see the light in a separate book-form. Nor are my thanks less due to Mr. William Evans, of Edinburgh (especially regarding the Gannet's parasites), the Rev. H. N. Bonar of Saltoun, Colonel H. W. Feilden, Mr. W. H. Mullens, Mr. H. S. Gladstone, and Mr. H. F. Witherby, and particularly to that eminent etymologist the late Professor Walter Skeat, whose knowledge of the meaning of animals' names stood unrivalled. To Mr. Rothschild I am indebted for an opportunity of examining his great collection of Boobies at Tring, and to Mr. C. B. Ticehurst for a translation of H. C. Müller's article on the Gannet, which is somewhat fuller than that by Professor Newton (p. 266), as well as for a series of Notes on Færöe Gannets by Knud Andersen, extending from 1897 to 1902. Nor must I forget that several eminent men in the United States, including Mr. F. M. Chapman of New York, Professor Verrill, Mr. William Brewster, Mr. H. K. Job, and Dr. F. A. Lucas have courteously answered letters and queries. I need hardly add that Mr. W. P. Pycraft's great knowledge of comparative anatomy has been no small help, but it cannot be said that anything like a perfect description of the internal parts of the Gannet has yet been published.

Through the kindness of friends I have collected a large series of Gannet photographs, from which those most suitable for publication have been selected, but no one has been able to secure a snapshot of a Gannet in the act of plunging, and this still remains a desideratum.

My conscience pricks me with having occupied five hundred and sixty pages with the history of one bird, but I console myself with the reflection that had the bird been the Cuckoo or the Raven, the book would have been much longer.

J. H. G.

Keswick Hall, Norwich,
May, 1913.

[*F. G. Abbott, Phot.*

SULA CAPENSIS AT ICHABO.

NOTANDA AND CORRIGENDA.

Page 3 line 18, *after* note, *add* and *S. melanura.*
after shown, *omit* in Chapter XIII.
8 ,, 7, *for* 30 *read* 100.
for 50 *read* 200.
,, 13 ,, 23, *for* Færoenes *read* Faeröernes.
,, 18 ,, 14, *for* 31 *read* 314.
,, 21 ,, 25, *omit* the brackets.
26, ,, ,, ,,
,, 25 ,, 6, *for* A better *read* Another.
,, 26 ,, 21, *add* Sorland (Falle's "Jersey," 1694).
,, 27 ,, 8, In modern times the Soland Goose has not been a favourite with the poets; Browning's allusion to it in "Paracelsus" is particularly unfortunate, but to Sir Walter Scott the bird was well known, and in "Marmion" we are introduced to :—

"winter cheer
Of sea-fowl dried, and solands store,
And gammons of the tusky boar,
And savoury haunch of deer."
"Marmion," Canto iii.

and it plays a part in "The Antiquary," by the same author.
,, 27 ,, 10, *for* thirteenth century MSS. *read* a thirteenth century MS.
13, *after* until the *add* mention in the.
,, 30 ,, 15, *for* 329 *read* 247.
,, 33 ,, 23, Mr. G. Damiani cites four occurrences of the Gannet in the Northern Adriatic, but one lacks confirmation ("Rivista Italiana di Ornitologia," 1913, p. 92).
,, 33 ,, 24, Considering that *Sula bassana* is only once known to have got as far as the coast of Syria, the idea that the Hebrew word *shalach*—translated Cormorant in Leviticus xi. 17 and Deuteronomy xiv. 17—should be rendered Gannet, is inadmissible. A Gannet was seen near Alexandria, by Mr. J. J. Neale on December 8th, 1912.
,, 36 ,, 13, *after* Hyères *add* where I examined two.
,, 39 ,, 2, *for* 45° S *read* 45° N.
,, 39 ,, 20, *for* VII. *read* IX.
,, 41 ,, 11, *for* Mygganaes *read* Mygganæs.
,, 41 ,, 12, *for* Sulusker *read* Westmann Islands.

Page 42 line 23, *after* 416 *add* "Itinerary" III. fol. 93, and V. fo. 75.
,, 45 ,, 5, *after* breeding *add* (aereacionis).
,, 46 ,, 2, *for* 1631 *read* 1615.
,, 65 ,, 11, In Brady's "Records of Cork" (1864) mention is made of the breeding of Gannets on The Skellig in 1700, as I learn from Mr. Ussher.
,, 66 ,, 27, *after* 235 *add, See* "Norwich Naturalist's Trans.," V., p. 40, and "The Field," 28.v.10.
,, 73 ,, 19, *add, See* "Field," May 28th, 1910. In 1884 a few bred on The Cow Rock.
,, 78 ,, 21, *for* Lesly *read* Leslie.
,, 79 ,, 5, *for* Lesly *read* Leslie.
,, 87 ,, 26, *after* stone *add* (of 14 lbs.).
,, 98 ,, 14, *after* thought *add* (*see* p. 257).
22, This belief was not confined to the Gannet, *cf.* "Birds of Shetland," p. 292.
,, 104 ,, 26, *Note.*—A Puffin contained 41 little fish ("Cardiff N. Tr., 1898-9, p. 43").
,, 106 ,, 24, *after* Islands *add* so killed.
,, 108 ,, 20, *after* of *add* from seventy to.
21, *for* X. *read* XVI.
,, 111 ,, 21, *for* 6,000 *read* 6,500.
,, 117 ,, 9, *for* Lesley *read* Leslie.
,, 154 ,, 16, In 1912 two thousand, two hundred were taken.
,, 164 ,, 6, *for* 5,000 *read* 8,000.
,, 171 ,, 15, *after* work *add an asterisk.*
,, 172 ,, 13, *for* a *read* at.
,, 177 ,, 10, *after* LIV. *add* p. 14, and.
,, 179 ,, 24, *for* ethes *read* lethes.
,, 195 ,, 11, *for* all copied from Boece and Gesner *read* chiefly copied from Boece.
196 ,, 20, *for* 1624 *read* 1623.
,, 201 ,, 8, *for* and therefore his testimony is the more noteworthy when he speaks, *read* but in that case he could not be sure.
,, 202 ,, 4, *after* p. *add* 1 and.
202 ,, 16, *for* which *read* because it.
,, 206 ,, 28, Lack is possibly a misrendering of Wrack=sea-weed.
,, 211 ,, 14, *for* ὦταισται *read* ὦτα ἴσται
,, 212 ,, 17, *after* are *add* Skarts (Shags). To Mr. H. S. Gladstone I am indebted for a fuller translation of the passage.

Page 213 line 10, *after* shillings *add* [Scotch].
,, 214 ,, 13, Robert Gordon died in 1661.
,, 219 ,, 3, *after* there *add* and may be compared with Pennant's plate.
,, 240 ,, 24, *for* t.c. *read* "The Bass Rock."
,, 256 ,, 25, *after* 1852 *add* aged 56.
,, 259 ,, 15, *before* Sheep *insert* The.
,, 260 ,, 7, *omit* young.
24, *for* Färoese *read* Færöese.
,, 262 ,, 15, *for* drongs *read* drengs.
,, 263 *before* Myggenaes *insert* Stack of
,, 265 ,, 15, *for* and *read* or.
,, 266 ,, 2, I have an egg given by Müller to John Wolley, about 1856.
,, 266 ,, 14, *for* drongs *read* drengs.
,, 267 ,, 13, *for* nest *read* nests.
19, *for* sitting about *read* up to.
,, 268 ,, 13, *for* remain *read* is.
15, *for* the parties *read* them.
,, 269 ,, 8, *for* People climb these Drongs with the help of poles which *read* The fowlers climb these drengs with the help of poles by which they. [I am indebted to Mr. C. B. Ticehurst for this, and the eight preceding corrections.]
,, 292 ,, 29, A list of Newfoundland voyagers is given in "Smithsonian Report," 1888, p. 524.
,, 294 ,, 28, *after* LXXI. *add* Smithsonian Report, p. 507.
,, 297 ,, 88, *after* there *add* in 1898.
,, 301 ,, 17, In 1864 Bird Rock was visited by Mr. A. S. Pachard ("The Labrador Coast," p. 96).
,, 313 ,, 14, In Gabriel Archer's "Relation of Captaine Gosnol's Voyage to the north part of Virginia . . . " under date of May 7th, 1602, Gosnol being as is supposed, in the neighbourhood of Cape Cod, writes " . . . . we first saw many Birds in bignesse of Cliffe Pidgeons, and after divers other as Pettrels, Cootes, Hagbuts [Shearwaters] Pengwins [Great Auks] Murres [Guillemots] Gannets, Cormorants, Guls, with many else in our English Tongue of no name." ("Purchas His Pilgrimes," ed. 1906, XVIII., p. 303.)
,, 331 ,, 18, *add*, *See* also "Ornithological Miscellany," III., p 210.
,, 335 The third photograph should precede the second.

Page 337 line 12, *after* extended *add* John.

,, 344 ,, 26, Mr. Drane mentions an egg not much larger than a Wood-Pigeon's.

,, 360 ,, 12, *after* now *add* [7 days old].

,, 372 ,, 15, Mr. Seton Gordon states that he has seen young Gannets dive repeatedly during their first swim ("Glasgow Herald," 14. xii.12), but this does not seem to have been observed by others. Numbers of young Gannets floating in helpless fashion on the water were passed by Mr. W. E. Clarke when leaving St. Kilda in October, 1910, and again on October 12th, 1911 ("Studies in Bird Migration," II., p. 222), but no mention is made by Mr. Clarke of any diving.

,, 374 ,, 3, Mr. Thomson of the Ailsa lighthouse stated that if there happened to be a gale in September, numbers of young Gannets were sure to be blown round to the side of the Craig which lies furthest from the breeding cliffs.

,: 374 ,, 20, *for* he *read* the.

,, 386 ,, Gannets eating entrails and fish-refuse thrown from a steamer ("Studies in Bird Migration" II., p. 224).

,, 391 ,, 14, We know from John Evelyn's Diary (Feb. 9th, 1665) that Gannets were sometimes kept in St. James's Park.

,, 393 ,, 6, *omit* four distinct kinds.

,, 394 ,, 11, *for* probably *read* as was thought in Martin's time, and by Mackenzie ("An. Scott. N. H.," 1905, p. 144).

,, 399 ,, 7, *for* other *read* most.

8, *omit* with the coracoids.

,, 400 ,, 29, *after* 284 *add* "Field," October 18th, 1890, and July 1st, 1911.

,, 401 ,, 19, An instance of a Gannet carrying a fish is given in "The Scottish Naturalist," 1912, p. 164.

., 428 ,, 23, *add* From what I have seen of Italian "Roccoli," I am prepared to believe that these artfully constructed decoys destroy as many birds as this in a year.

,, 430 ,, 2 and 3. 398 is probably too high, Mr. Nicholson, who has worked the sum out, makes it only 370, and another friend 373. According to Darwin, it would be possible for eight pairs of Robins under the most favoured circumstances to produce 2,032 descendants in seven years ("Foundations of The Origin of Species" edited by Francis Darwin, p. 89).

,. 430 ,, 25, *after* 78) *add* The take in 1911 is stated by Mr. Eagle Clarke to have been over 9,000.

,, 435 ,, 21, Buffon mentions one so killed near Montreuil in December, 1777.

Page 437 line 4, *omit* years.

,, 441 ,, 16, *after* Europeênne *add* ".

,, 452 ,, 32, *add* Cormorants of 12, 19, and 23 are also recorded.

,, 459 ,, 20, I remember quite well an amusing correspondence some forty years ago in "Land and Water," on the merits of young Gannets as food (*see* "L. and W., February 13th, 20th, 27th, March 6th, 13th, 1869).

,, 466 ,, 10, *for* banfones *read* bawsones—Ben Jonson writes of a "Smooth bawson cub, the young grice [little pig] of a gray. . . ."

,, 474 Mr. Evans considers this nestling to have been three days old.

,, 482 ,, 23, *after* his *add* Fou intermediare.

,, 544 ,, 32, A photograph of Ichabo by Mr. F. G. Abbott is very confirmatory of Dr. Lowe's description. Mr. Abbott states that there are more Gannets on Ichabo than at Bird Island, Algoa: for a view of Ichabo *see* "The River Okavango," p. 349.

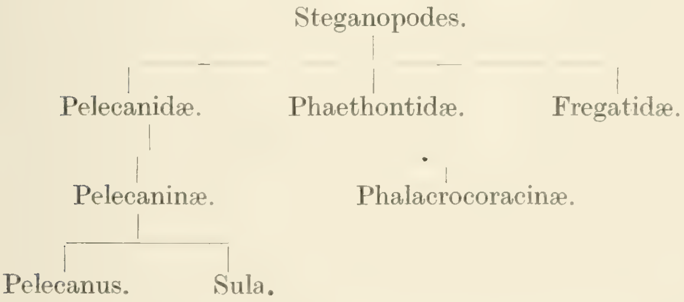
,, 546 ,, 9, *after* Island *add* Algoa.

,, 554 ,, 23, Some parasites from a Gannet taken on the Norfolk coast on April 12th, 1913, were identified by Mr. Wm. Evans as *Lipeurus* (*Pectinopygus*) *pullatus* (13 adult ♂♂, 16 ad. ♀♀, 6 immature), and 3 *Menopon pustulosum*, Nitzsch. The latter has never been obtained by Mr. Evans from the Bass.

INTRODUCTION.

The Gannet, or Solan Goose, which is the subject of this memoir, belongs to the order Steganopodes, a word coined by Illiger in 1811 for a large group of birds, signifying the union of all the toes in a single web.

The Steganopodes, a natural group, with a persistent type of pterylosis, are commonly held to include three Families, of which the *Pelecanidæ* is one. The *Pelecanidæ* again, are divisible into the *Pelecaninæ* and *Phalacrocoracinæ*, and the former of these is again divided into *Pelecanus* and *Sula* (Gannets).


Steganopodes.
Pelecanidæ.
Phaethontidæ.
Fregatidæ.
Pelecaninæ.
Phalacrocoracinæ.
Pelecanus.
Sula.

Illiger's generic name of *Dysporus* for the Gannets, though employed by Dr. R. B. Sharpe, has not been generally used.

nor has that of *Moris*,* conferred by W. Leach in 1816, and altered by Vieillot to *Morus* in 1817, found favour. I have deemed it safest under these circumstances to follow the generality of authors in making use of *Sula*, a name applied by Mathurin Brisson in the "Ornithologie" (1760), and since generally adopted in all works of authority.

It is not intended in this volume to enter into a consideration of the specific differences which constitute the characters of the different kinds of Gannets, the greater part of which are best known in popular language under their English appellation of Boobies. A key to the Family *Sulidæ*, by Mr. W. R. Ogilvie-Grant, which cannot but be found very useful, giving the leading characteristics of nine species, to which three more subspecies have been added since, is given in the "Catalogue of Birds in the British Museum" (XXVI., p. 424 *et seq.*). Of two of these, *S. capensis* and *S. serrator*, we shall have more to say further on, in an appendix, for it is these, together with *S. bassana*, which in the restricted sense of the word are the true Gannets.

Of these three true Gannets the bird now under consideration is the northern species, or, as it might not inaptly be called, the Atlantic Gannet. Assuredly it has a special interest for every Englishman, not only because it is *par excellence* a British species, but because we can verify its having bred in this country no less than 633 years ago (*temp.* Edward I.), as will be shown in the account of Lundy Island. Up to the present, one attempt only has been made to split *Sula bassana* into two species, and that was many years ago by Prince Bonaparte, who, for reasons which do not appear to have been given, called the trans-atlantic Gannet *Sula americana.** This name is not recognised by any of the naturalists of the United States, but according to Professor Macgillivray, American Gannets are the largest, a difference which by itself could hardly be specific. Gannets with black tails have also received the name of *Sula lefevri*, Baldamus (*cf.* "Naumannia," 1851, Part IV., p. 38, *note*), but it will be shown in Chapter XIII. that this is only the last remains of immaturity, and that such birds are not to be confounded with an allied species inhabiting South Africa, even though for a short period of their lives they are almost indistinguishable from them.

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* Mr. W. Stone says the enforcement of the code of the American Ornithologists' Union would require the use of *Morus* Vieill. in preference to *Dysporus* ("Auk," 1907, p. 194), which is synonymous with *Sula*. Leach's names were printed without any description, and Mr. O. Salvin doubted if his List was even ever actually published (*see* "Leach's S. Cat." reprinted by The Willughby Society, in 1882).

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* "List of the Birds of Europe and North America," 1838, p. 60. The practice of publishing new specific names in any form without giving descriptions is objectionable.

To see the Gannet at its best a visit must be made in the summer time to one of its eight British breeding stations, of which no less than seven are on the west coast, which, being the more rocky, has the more attractions for it. Here, any man who has the heart of a naturalist may be promised a spectacle of surpassing interest, which will not disappoint him, however great his anticipations may have been, but of this more presently. Altogether there are only fifteen breeding places of this species in the world, including Lundy, which is, I hope only temporarily, forsaken; indeed it is probable that the number has never, in historical times, exceeded twenty, and this is fewer than is the case with any other European bird which breeds in companies. As I have only visited three Gannet stations, for an expedition to the Skelligs was a failure owing to weather, I must depend on the information of others for what is to be said of the rest. Here it may be convenient to give a list, in order of the date at which each "Gannetry," if it be permissible to use such a word, was first known to us; not that it is for a moment implied that most of them had not existed for ages before naturalists had heard about them :—

Lundy,*	England,	first known in	1274
Bass,	Scotland	,, ..	1448
Ailsa	,,	,, ..	1526

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* At present forsaken.

Bird Rock, Canada,	first known in		1534
Sulisgeir, Scotland	,,	...	1549
The Færöes	,,	...	1673
St. Kilda, Scotland	,,	...	1697
The Stack, ,,	,,	...	1710
Skellig, Ireland	,,	...	1748
Sulusker, Iceland	,,	...	1758
Eldey ,,	,,	...	1758
Grimsey ,,	,,	...	1819
Bonaventure, Canada	,,	...	
Grasholm, Wales	,,	...	1820 ?
The Bull, Ireland	,,	...	1853

Seeing that nine of these fifteen stations are around the British Isles the Gannet may be emphatically called a British bird.

As regards the numbers which inhabit these stations, a very great divergency of opinion has been expressed, some having put forward estimates which the facts at our disposal do not warrant our crediting. That it is very desirable to get at a correct census of some of our native birds, no one can deny. It would assist us in assigning causes for the predominance of one species over another, and be of utility in other ways besides; moreover if a fairly correct census could be arrived at with only a single species, there would at once be a standard whereby to gauge the others. Accordingly great pains have been taken to come at some estimate of the number of Gannets at the eight occupied British stations, but it has proved to be a task beset with difficulties. The author is conscious that the figures now offered are not very satisfactory, yet they rest on a basis of some sort, which is not the case with the enormous numbers guessed at with but little show of reason by some zealous writers in the past.

DESTRUCTION OF GANNETS.

At one time Gannets would appear to have been subjected to great persecution in America.* Moreover, on different occasions they have stood in no small danger of a like persecution in this country. This was the case in 1877, when Messrs. Frank Buckland, Spencer Walpole, and Archibald Young were appointed Commissioners to enquire into the conditions of the Herring Fisheries of Scotland. Birds naturally came under consideration as well as fish, as is evident from the repeated references to them in the Commissioners' Report published the following year,† in which, though admitting that the herring fishery had increased and was increasing, yet they recommended the repeal of the Sea-Birds' Preservation Act protecting "Gannets, and other predacious birds," so far as it applied to Scotland. The consequences of this recommendation, proceeding as it did from the accredited representatives of Government, might have been serious for the Gannets of Scotland ; fortunately, however, the "Times" newspaper at once published a strong remonstrance* from the pen of Professor Newton, and not long afterwards the same able advocate, in conjunction with Mr. H. E. Dresser, brought the matter before the British Association at Dublin.

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* *See* Audubon, "Orn.," IV., p. 224; "Auk," 1888, p. 129.

† "Report on the Herring Fisheries of Scotland" (London), 1878.

A brief being now held for the Gannets, it was soon seen that there was a great deal to be said in their favour, as well as something against them, and in the end the existing law (The Sea-Birds Act of 1869) remained as it was. It has been superseded now by newer legislation, but it is legislation under which the Gannet is protected in summer everywhere except at St. Kilda. Though difficult of proof, it is not likely that the removal of the Gannet or any other sea-bird in large numbers, would be followed by a corresponding increase of fish, but as a cry for their destruction may again arise, I would not have this book published without advancing a few arguments in favour of the preservation of one of the most beautiful of marine objects.

(1) In the first place it may be invidious to shift the blame, be it much or little, but as a matter of fact less harm

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* Reprinted in the Report of "The Close Time Committee of the Brit Assce." (1879, p. 146).

must be done by the Gannet than by the Puffin, Guillemot, Cormorant, and Shag, because, though smaller birds, the numbers of these latter are far greater. There is no comparison between the number of Puffins around the British Isles and the number of Gannets ; they would probably be as 30 to 1, or even as 50 to 1, for it is not improbable that the Puffin at the present day is the most numerous of all British birds, the ubiquitous House-Sparrow excepted.

(2) Then, again, Cetaceans, and all the larger fish, such as cod, ling, hake, dogfish and salmon, feed on herrings to a large extent. Frank Buckland and the other commissioners held that the annual destruction of herrings by larger fish than themselves was something like 30,000 millions, twelve times as many as all the herrings caught by English, Scotch, Irish, Dutch, and Norwegian fishermen put together (" Report," *l.c.*, XI.). This statement of the Commissioners is apparently no exaggeration. At any rate it received confirmation from Professor Huxley in a lecture on the herring in 1881, at which I was present. On that occasion Professor Huxley's words were that five million cod, ling, and hake had been taken by Scotch fishermen in one year (1879), and allowing these fish to have eaten two herrings a day, they would have consumed 3,500 millions.* It is therefore evident that these predacious fish take

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* The professor's address is reprinted in "Scien. Memoirs," IV., p. 490.

a much larger share than the Gannets. As Professor Huxley has well said, the Gannet is only one among a host of enemies with which the fish have to contend, and if we are to reduce the numbers of one enemy, to be consistent, we must reduce the numbers of all. But who is there, with a love of Nature in his soul, who will not agree that there are enough herrings in the sea for man and the birds too, and that for the sake of their beauty the Gannets are worth their share of them.

(3) But the most potent argument in favour of the Gannet is that the breeding of sea-fish—*e.g.*, herrings and mackerel—*is almost without limit*, and that being so, Gannets and other birds, and fish also, may eat almost any number they like, without appreciably diminishing the general source of supply. In support of this it would not be difficult to quote figures from several sources, but I will content myself with one, and that is the catch of herrings as taken from authorized returns, as issued from one port, that of Great Yarmouth. This is not the only port of our great east coast fishery, there are Lowestoft, Grimsby, and others, to say nothing of the Scotch ports, but Yarmouth has long been one great emporium of the trade.

On November 13th, 1902, a single herring smack put into the port of Great Yarmouth with 396,000 herrings. Two days previously the fishing fleet had landed between 54 and

55 millions. The total for this season (the best the Yarmouth men had had up to that date) was subsequently published as 631,578,800 herrings. The next year it was 525,056,400, and in 1904 it was returned at 540,685,200 for this port alone, and be it remembered that a vast number of herrings were also landed at Lowestoft, Grimsby, Whitby, and other places. The year 1907 was again a very good one. In that season, on a single day—October 22nd—the North Sea Herring Fleet brought into Great Yarmouth between 5,000 and 6,000 "lasts."* Well might it be described in the "Eastern Daily Press" of October 23rd, and other newspapers, as an unparalleled delivery, nor was this glut of fish wasted, for, owing to the German trade, there was a brisk sale at once.

(4) It must also be put down to their credit that Gannets are not infrequently of value to fishermen by pointing out the whereabouts of shoals of fish, which their marvellous sight enables them to detect with far greater quickness than our fishermen, who then shoot their nets accordingly. I

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* "Herrings are counted by the long hundred (132), therefore 6,000 lasts of 10,000 each would be 13,200 × 6,000 = 79,200,000" (T. Southwell *in litt.*). "The toll taken by predacious fishes and birds," adds Mr. Southwell, who has long paid attention to the ichthyology of the east of England, "may be taken as the natural check to overproduction; the herring is so wonderfully productive that without these checks they would eventually fill the sea, the fish-eating birds are therefore a positive benefit!"

am told that in Cornwall, where the pilchard fishery is so important, the fishermen are specially alive to the Gannets' utility in this respect, and look upon them as allies rather than as rivals.

(5) Again the fact must not be lost sight of that although no longer used as human food in the British Isles, young Gannets have in the past been an important article of consumption among the islanders of St. Kilda, and it is conceivable that they might become so again. This is putting the young to a legitimate use, and for such a purpose one must not grudge their being taken.

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Macgillivray, British Birds, V., p. 405	1852
Muller, Færœnes Fug.	1863

	Published in
Cunningham, Ibis, 1866, p. 1	1866
Collett, "Norges Fugle," Christiania Forhandl, 1868, p. 182	1868
Gray, Birds of the West of Scotland, p. 458	1871
Gould, Birds of Great Britain	1873
Dresser, Birds of Europe, VI., p. 181*	1880
Booth, Rough Notes on Birds, III., Pls. 1-6	1883
Yarrell, Hist. British Birds, 4th ed.	1885
Giglioli, Avifauna Italica, p. 274, 2nd ed., p. 420	1886
Harvie-Brown, Fauna of the Outer Hebrides, p. 94	1888
Saunders, Manual of British Birds, p. 353	1889
Lilford, British Birds, VII., p. 9	1890
Newton, Dictionary of Birds, p. 300	1893
Lee, British Birds in their Nesting Haunts, II., p. 68	1897
Grant, Catalogue of Birds in the British Museum, XXVI., p. 425	1898
Ussher, Birds of Ireland, p. 155	1900
Macoun, Catalogue of Canadian Birds, p. 65	1900
Barrington, Migration of Birds	1901
Harting, Handbook British Birds, 2nd ed., p. 285	1901
Dresser, Palæarctic Birds, p. 561	1902
Oddi, Atlante Ornitologico, p. 493	1902

* Here the description of the adult female is really intended for the immature Gannet of either sex.

	Published in
Wiglesworth, St. Kilda and its Birds, p. 48 . .	1903
Naumann, Naturgeschichte der Vögel Mitteleuropas (ed. 1903-4)	1904
Harvie-Brown, Fauna of N. W. Highlands, p. 213	1904
Harvie-Brown, Fauna of the Tay, Vol. X. of "The Vertebrate Fauna of Scotland," p. 216 . .	1906
Newton, Ootheca Wolleyana, II., p. 453	1907
Pike, Adventures in Birdland, p. 115.	1907
Pike, Through Birdland Byways	1911

CHAPTER I.

NAMES OF THE GANNET.

Names which have been applied to the Gannet—Norse Names for it—Gaelic Names—Earliest known Reference to this Bird—Origin of the word "Gannet"—Professor Skeat's Explanation of it—Origin of "Solan"—Paucity of Information before the Sixteenth Century—Representations by the Early Writers not to be commended.

Scientific Names.

Sula bassana, Brisson.
Pelecanus bassanus, Linnæus.
Sula alba, Meyer.
Dysporus bassanus, Illiger.
Moris bassanus, Leach.
Morus bassanus, Vieillot.
Sula americana, Bonaparte.
Sula lefevri, Baldamus.

In its immature plumage the Gannet is the *Pelecanus maculatus* of Gmelin, also the "Fou tacheté" of Buffon, the Spotted Booby of Latham, and the Great Booby of Catesby; and, when nearly adult, the *Sula Hoieri* of Clusius.*

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* Ab imo collo ad ouropygium usque ductâ per dorsum mensurâ pedem Romanum longa erat: à capitis vertice ad dorsum usque, uncias undecim,

Vernacular Names.

Bass-Tölpel, German.
Schottengans, German.
Jan van Gent,[*] Dutch.
Basaangans, Dutch.
Gent, in Heligoland.
Le Fou de Bassan, French.
Boubie
Harenguier } Names in Normandy (Kerville).
Marga[†]
Alcatraz,[‡] Spanish.
Ganso-patôla, Portuguese
Mascato, Portuguese } ("Ibis," 1887, p. 31).
Facão, Portuguese
Sula bianca, Italian.

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colli ambitus totidem crassus erat, rostri, quod valde mucronatum & firmum habebat, longitudo, unciæ quinque cum semisse: rostri pars crassior, & quæ circa oculos, nigra erat; corporis ambitus viginti quatuor uncias, hoc est, binos pedes Romanos explebat, alæ plus quàm pedem longæ, caudæ vero longiores pennæ septem unciarum longitudinem non superabant: crura satis tenuia infirma habebat (Exot. Lib. decem., 367). The above is Clusius' description of a dried bird, sent by Dr. Henry Hoier, physician in Bergen, Norway, to Dr. Peter Pauw, in Leyden.

[*] "The Dutch 'Jan van Gent,' *i.e.*, John of Ghent," writes Professor Newton, "is a sailor's name: Gannet and Gans conveyed no particular meaning to them, so, as often happens with illiterate men, they took the name of the town as something tangible."

[†] I have more than once heard "Margot" applied to the Gannet in the "Pas de Calais." Professor Newton thought this provincialism might have its derivation in *Mar* (mare) and *Gwas* (a goose).

[‡] Sometimes also used for Gulls (Irby), also for the Pelican (Skeat).

Gwydd Lygadlon = clear-eyed Goose, Welsh
Gwylan Wydd = Gull-Goose, Welsh
Gans, Welsh
} See Forrest's "Fauna of North Wales," p.253, and Spurrell's Welsh Dictionary.
Hafsúla, Icelandic.
Havsula, Danish.
Tossefugl, Danish.
Sillebas, Swedish
Hafssula, Swedish
} (C. R. Sundström).
Bergshammar, Swedish
Suula, Finnish.

Local Gaelic names (by A. Carmichael*) :—Amhasan : Amhasag : Asan : Súlaire : Ian Ban an Sgadan = the White Bird of the Herring : Guga = the Young Gannet (*cf.* "Annals, Scottish N. H.," 1905, p. 144) : Sulaiche.† Colonel Feilden states, on the authority of Svabo, that the young Gannet with down still on it is called at Myggenœs in Feroe "Ompel,"‡ a word not in the Danish or Gaelic dictionary, and of which the sense is not clear. Professor Skeat, who has been good enough to assist me, suggests that it may be a variant of the Norwegian

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* As contributed by him to Harvie-Brown and Buckley's "Fauna of the Outer Hebrides" (p. 94).

† Armstrong's Gaelic Dictionary (1825) has Sulair, s.m., a St. Kildian bird, pl. sulairean, and sulaireach = "full of Soland geese," applicable to an island.

‡ "Zoologist," 1872, p. 3286.

"Ömmer," which is another spelling of Norwegian *Imbre*, and means a loon.

Earliest known references to Gannets.—What must needs be the earliest mention of this bird by name, at all events in English literature, is to be found in the ancient Anglo-Saxon poem of Beowulf,* where the words "Gannet's bath" are used as a figurative expression for the sea:—

> "Manig otherne
> Gódum gegrettan
> Ofer ganotes bæth."
> [Oꝼeꞃ ꝫanoꞇeꞅ bæð].

I have only quoted three lines. The whole passage is thus translated by Mr. Kemble:—

> "Between the tribes of the Geáts, and Gar-danes, there shall be peace, and contention shall rest, the hostile malice which they before endured; that our treasures should be in common, whilst I wield the wide realm; many a one shall greet the other with benefits, over the Gannet's bath."

Mr. Kemble says the events described in the poem took place in the fifth century, and that the date of the writing of it was subsequent to Augustine's Mission, A.D. 597. Professor Skeat observes (*in litt.*) that the handwriting is only of the tenth century, the copy being a late one, but that the wording is in the main far older, going back to the sixth century.*

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* "The Anglo-Saxon Poems of Beowulf," edited by John N. Kemble, 1833, Vol. I., p. 129, and II., p. 76.

Another Anglo-Saxon mention of the Gannet is in the "Codex Exoniensis," where reference is made to the cries of birds—that of the Gannet—"ganetes hleothor"—and of another species—"hu-ilpan sweg"—(Thorpe's ed., 1842, p. 307). Mr. Thorpe translates this passage: —

> "At times the swan's song
> I made to me for pastime,
> the Ganet's cry,
> and the hu-ilpe's† note,
> for men's laughter."

A third mention of the Gannet, in the Anglo-Saxon Chronicle, which has already been brought to the notice of naturalists by Professor Cunningham,‡ runs:—

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* In a vocabulary in the British Museum published by Mr. T. Wright (A.-S. Vocab., ed. Wülker, col. 259), which has been supposed to be of the xith century, sixty-six birds' names are given in old Latin and Anglo-Saxon, of which three are—*Mergus*, dop-fugel [diving fowl]; *Fulix*, ganot [Gannet]; *Anser*, hwite gos [white goose]. Another MS., also ascribed by him to the xith century (col. 101), has *Fulix*, ganot, oththe dopened [*i.e.*, Gannet or dipping duck].

† Probably the Curlew. (*see* Notes in *Phil. Soc. Trans.*, 1906, by the Rev. Professor Skeat, p. 364), who says a base of this form would answer to a later Northern E. *whaup*, which means a Curlew, or as a verb, to cry as a Curlew, to whistle. He adds (*in litt.*) that the A.-S. word is *huilpan*, gen. of *huilpe*, *i.e.*, *hwilpe*, and that the hyphen is a mistake.

‡ "Ibis," 1866, p. 1. A slightly different rendering is given in the Parker MS. ("Earle's Saxon Chronicles," p. 126).

"Over the rolling waves,
over the Ganet-bath
[Oꝼeꞃ ᵹanoꞇeꞅ bæð],
over the water-throng,
the abode of the whale."

The above is the Rev. J. Ingram's translation. In this case the events celebrated by the poet took place as late as A.D. 975, but Mr. Ingram finds it difficult to say when this portion of the Chronicle was penned, but probably in the twelfth or thirteenth century. A fourth mention occurs in a Runic poem—"A ship [literally *oak*] often saileth over the Gannet's bath" ("Archæologia," XXVIII., p. 344; "Bosworth and Toller's A.-S. Dictionary," 1882, p. 361). I learn from Professor Skeat that there is yet a fifth mention of the Gannet in the A.-S. metrical psalms; psalm 104, verse 35; where the nom. pl. *ganetas* occurs. These very early Saxon mentions of the Gannet, though they tell us nothing about it but its name, are yet very interesting as showing how common and well-known the bird must have been a thousand years ago.

Origin of Gannet.—"Gannet" is a name which, as has been shown, is of the highest antiquity. Referring to Professor Skeat's "Etymological Dictionary," 1901, as Professor Newton has done in his "Dictionary,"* and

* "Dictionary of Birds," p. 300.

especially under the words "Gander," "Gannet," and "Goose," it appears that two forms, besides the German "Gans," are from Teut. *gan* : Indo-Germanic *ghan*, whence also the Greek χὴν, and the Latin *anser*. Professor Skeat gives Middle English contraction *gante* ; Old High German *ganazo*. The etymology of birds' names is a recondite subject, and one with which I can claim but little acquaintance. "Gan" stands in Cornish dialect, according to Borlase, for *white* (Borl., C—E, "Vocab.," 1769), which certainly accords with the colour of the bird, but such a word is quite unknown to Professor Skeat.

It is more likely that the true meaning of *Gannet* is, as Professor Skeat points out, the bird which gapes (χαίνειν or χασκειν = to yawn),* in which sense it is even more applicable to *Sula* than to *Anser*. Assuredly the Gannet can and does gape, opening its mouth very wide, both to bite and to cry out, and it gapes on its nest in hot weather (*see* Chapter XIV.). According to Wright, "to gant" is a north-country provincialism for "to yawn" ("Dict. Obs. and Prov. Eng.," II., p. 497), and Jamieson, in his "Dict. of the Scottish Language," has "Gant, Gaunt, s., a yawn"; see also article "Gant" in the "English Dialect Dict." (II., p. 557), and "Gannet" in Murray's "New English Dictionary."

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* *See* Skeat, Art. "Goose."

There are nine ways in which the name "Gannet," as applied to the bird, has been spelt, including "Gaunt." "Gaunte" is made use of in John Skelton's "Boke of Philip Sparrow," 1508; and "Gaunt," which is the same word, by Sir H. Gilbert, in 1583 ("Hakluyt's Voyages," III., p. 195).*† In Ralfe's "Birds of the Isle of Man" "Gaunt" is given as a provincialism formerly in use.

Origin of Solan.—The origin of the name "Solan,"—*Solendæ* of The Cupar Codex (believed to have been written in 1447),—a name much more made use of in Scotland than "Gannet," and which Conrad Gesner in 1555 spelled "Soland," is thus given by John Blaeu in his great geographical work ‡:—"Hi anseres nomine vulgari è Latino, ut puto, detorto, Solen vocantur, quod male pronunciant Soland, id est, anniversarii: ad nos enim veniunt semel

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* According to Pennant, this latter spelling has been applied to *Podicipes cristatus* ("British Zool.," II., p. 498), and Mr. Harting gives a possible instance of its being used for a Grebe in Edward I.'s time ("Zoologist," 1884, p. 350).

† In one version of the "Promptorium Parvulorum," an English-Latin Dictionary, compiled in the Fourteenth century, occurs: "GANTE, byrde, *Bistarda*," to which the late Mr. Albert Way, in his edition, published in 1843 by the Camden Society, appended a note (p. 186) to the effect that *Gante* meant Gannet, but the passage cited by that learned antiquary in support of this view does not confirm it, for it is an entry in the "Exchequer Roll of Normandy," A.D. 1180 (p. 57), of a payment of £6 3s. 9d. for the pasturage and carriage of 120 *gantarum* brought from England to Normandy. The *ganta* here must, in Professor Newton's opinion, have been common domestic Geese, and he adds, in the "Manipulus Vocabulorum," a similar work of later period by Levins, we have (ed. Wheatley, 1867, col. 88) GANNET rendered by *Penelops*, that is to say, some sort of Duck.

‡ "Geographia Blavianæ," 1662, Lib. XII., XIII. (Dutch edition, 1654). I am indebted to the late Professor Newton for a sight of this rare and splendid folio, not often to be seen.

unica solum vice in toto anno.” The derivation of the word here given is ingenious, but can hardly be accepted as the right one. Neither can any derivation from the verb *Socla*=to linger, be accepted. Professor Skeat does not believe there is such a word in any language. A better explanation is that propounded by Martin (“A Voyage to St. Kilda,” 1698, p. 49), namely, that “Solan,” a name given to the bird “which with eyes directed forward sees its prey from afar,” was derived from the Irish (*i.e.* Gaelic) word “Sou’l-er.” Quickness of sight is a character which is possessed by the Gannet in a marked degree. Professor Skeat has obliged me with the following comments :—“I can find no Irish or Gaelic *sulaire*, ‘eyer.’ Apart from false forms, what we really find are : Irish *suil*, ‘eye’; *suileog*, ‘little eye’; *suileach*, ‘sharp-sighted’ (O’Reilly). Gaelic *suil*, ‘eye’; *suileag*, ‘little eye’; *suileach*
suilteach ‘sharp-sighted’ (Macleod). O’Reilly also has : *suilaire*, ‘a soland goose.’ Macleod only gives in his English-Gaelic part : ‘solan goose, *sulair*, *guga*’; and in the other part, *sulair*, ‘the Gannet.’ . . . . The Gaelic *sulair* (Irish, *sulaire*) does not mean ‘watchful.’ It simply means ‘Gannet,’ and is an Irish and Gaelic borrowing from Norse. *Solan* is not Celtic ; it has no sense in Celtic.”

Professor Skeat was the first to explain that the final *n* in *solan* stands for Icelandic *sūla—n*=“the Gannet.”

shortened from *sūla hin* = "Gannet the": because Icelandic puts the definite article after its substantive, as in Danish and Swedish.

Spelling of "Solan."—In the sixteenth and seventeenth centuries everyone was free to follow his own fancy in spelling, which accounts for there being no less than fifteen variants of *Solan* :—

Solan.
Soland (Lowland Scotch).
Solande (Bishop Leslie).
Solend (Gesner, 1555).
Solund (Grew, 1681; Wesley, 1772).
Solane (Act of Parliament, 1592).
Solen (Blaeu, 1662).
Solent.
Sollem.
Solem
Solemne } (Brereton, 1635).
Sollen (Lauderdale Accounts).
Solayne (Monipennie, 1597).
Sule.
Sulan.
Sullen (Earl of Aberdeen's Accounts, 1682: Hist. MSS., Com. V., 610).

The second spelling—that of "Soland," which is Lowland

Scotch—is traceable as far back as Holland's poem of the Houlate (*i.e.*, Owl, or Owlet), written about A.D. 1450:—

> "And als in the advent,
> The *Soland* stewart was sent;
> For he could fro the firmament
> Fàng the fische deid."
> "Houlate," III., 5.

Paucity of Records before the Sixteenth Century.—As will be related presently, it is in thirteenth century MSS. that we have the first recorded allusion to any Gannets' breeding-place, and this was to the now deserted settlement of Lundy. From then until the Scotichronicon and Botoner's "Itinerary," considered to have been written about 1478, of "aves vocatæ ganettys" breeding on an island, which was most likely Gulland, we hear nothing more about these birds. But similar lack of information exists concerning almost every other kind of British bird, for birds were not a subject in which the small number of lettered men of those days took any interest, except it were a culinary one. It was not until the appearance of Conrad Gesner's great work, the "Historia Animalium," and William Turner's short but invaluable Commentary on Birds, that literature had further to tell us about Gannets, except in so far as they are incidentally described in the early accounts of the Bass Rock by John de Fordun (1448), and one or two others, whose narratives must be reserved for consideration later on.*

Representations by the Early Artists.—There are several early representations of the Gannet, but they possess only an antiquarian interest in the present day, and would hardly be referred to in any modern synonymy of the Gannet. The efforts which the early naturalists made in pursuit of learning are worthy of all commendation, and the measure of success which rewarded their attempts to delineate birds in the face of difficulties which an ornithologist of the present generation has not to contend with, was far greater than some of us realise. Before the birth of the great reformer of natural history, the art of cutting on blocks was in its infancy, and there were then no pictures of birds which in the present day would be deemed worth serious study.

1. Hence, with all desire to praise, one cannot say much for Conrad Gesner's figure,† the earliest attempt to delineate a Gannet, which Brisson (1760) afterwards designated as "icon pessima"; but it was done 400 years ago, and Gesner's letterpress generally makes up for his artist's somewhat rude handiwork. His Gannet (*see* the copy of it by Mr. Wilson) has a very blunt beak and a very ragged tail, the former an

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* The Cormorant and Pelican are described in Pierre Belon's "Histoire de la Nature des Oyseaux," 1555, but not the Gannet.

† "Hist. Animalium," 1555, Lib. III., p. 158. The four toes are also insufficiently joined together.

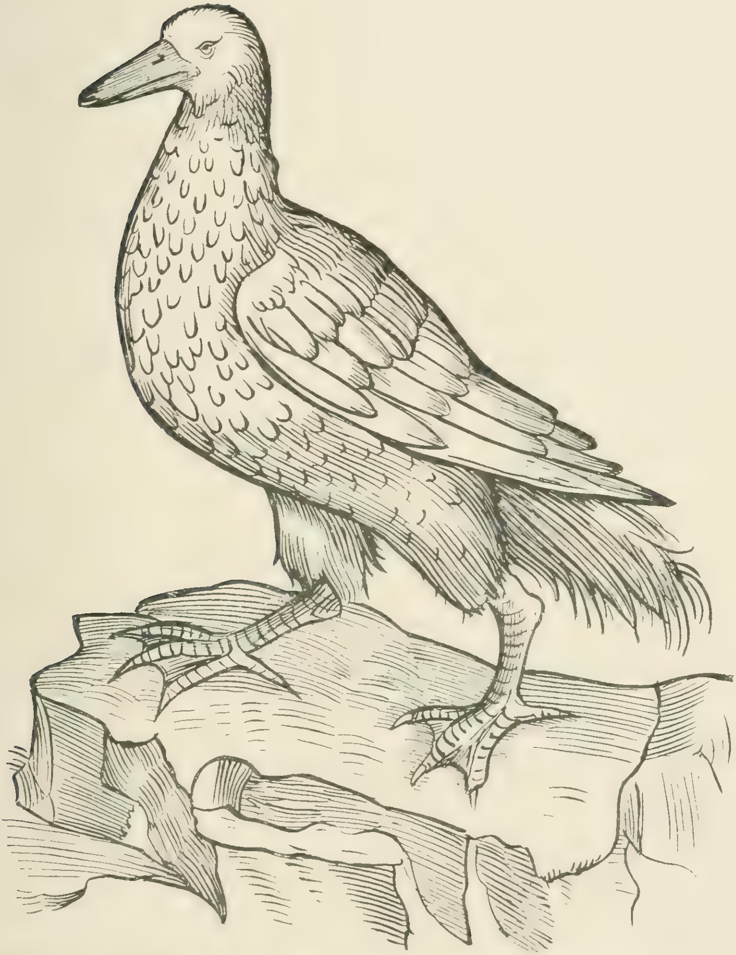

FIGURE OF THE GANNET IN GESNER'S "HISTORIA ANIMALIUM."

imperfection in the block, the latter perhaps the effect of confinement, for the drawing of this bird was sent to him from Scotland by Henry St. Clare (or Sinclair),* who may have kept it alive.

2. Clusius' figure† is taken from a drawing sent to him, with one of the *Mergus americanus* (the Great Auk)—also copied on the same page (p. 103)—from America, by "ornatissimus vir Jacobus Plateau." The figure is a poor one, but seems, as Professor Newton remarks, to have been done from a real bird.

3. Willughby and Ray give a figure in their well-known "Ornithologia," 1676 (Tab. LXIII.), which is good, though the tail is not pointed enough: perhaps it was drawn from the example picked up at Coleshil, in Warwickshire, and described in their work (*l.c.*, p. 329), and they may have made some attempt to keep the bird alive.

4. Sir Robert Sibbald, in his "Scotia Illustrata" (1684) gives three figures:—Tab. IX., Fig. 1: Caput veteris Anseris Bassani; Fig. 2: Anser Bassanus junior; Fig. 3: Pes senioris, all of which are creditably executed for the time when they were done, and appropriately embellish the work of this prolific author. In his later work—a "History of the Sheriffdoms of Fife and Kinross" (1710)—he has a long

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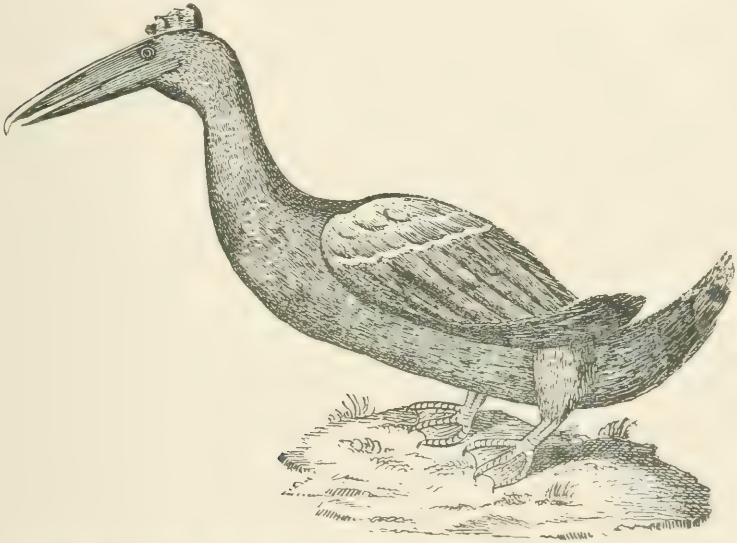
* Professor Newton observes that this seems to have been Henry Sinclair, Bishop of Ross (born 1508, died 1565), who also sent Gesner figures of the Great Bustard and Capercaillie.

† "Caroli Clusii atrebatis Exoticorum Libri decem.," 1605. Book V., Ch. VII.

account of the Gannet in Chapter II., but all the facts had already been given by other writers, so it need hardly be quoted.

5. Eleazer Albin, in his "Natural History of Birds," 1731 (I., p. 82), gives his Gannet five toes, although correctly stating in the letterpress that it has only four, but otherwise the plate is passable.



THE GANNET IN PONTOPPIDAN'S NATURAL HISTORY OF NORWAY.

6. Then we have the delineation in Bishop Pontoppidan's "Natural History of Norway" (1753),* where the *Har-Sule*

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* "Det förste Forbög paa Norges Naturlige Historia," II., p. 104, English edition, II., p. 76. The figure is copied in Lloyd's "Scandinavian Adventures."

(*i.e.*, *Sea Sule* or *Solan*) is supplied with a large comb on the top of its head, stated in the text to be red. The Bishop was generally accurate, but here his description of the so-called Gannet applies better to the drake of *Somateria spectabilis*, with which he may have somehow confounded it.

7. This concludes all the references to figures given by the early writers, or such as call for any remark, for there is no figure of a Gannet, as has been supposed, in Aldrovandi's "Ornithology" (1603). That which John Jonston, the copyist of Aldrovandi's, erroneously thought to represent this bird (Lib. XIX., Cap. XX.), and which he reproduced as such in his "Historia Naturalis de Avibus" (Tab. XLVII.) under the title of "Anser Bassana," or "Scottisch Gans," was meant, remarks Professor Newton (*in litt.*), by Aldrovandi to illustrate his article on the Great Bustard (*l.c.*, index *under* "Gustarda"). It is more like a Scoter Duck than anything else, but is armed with spurs (!), and was considered by Professor Newton to be an adaptation from Gesner's plate. Neither has Belon any figure of the Gannet, but among the rude woodcuts of birds in the "Ortus Sanitatis" of De Cuba (1480), there is one which, under the name of *Mergus*, is possibly intended to be a Gannet ("Tract. de Au." LXXV.). De Cuba's illustrations are said to have been generally drawn to fit his own descriptions.

CHAPTER II.

DISTRIBUTION OF THE GANNET.

Geographical Distribution of the Gannet—Its Distribution in Winter –Not the same as in Summer—An enumeration of its fifteen Breeding Places—of which nine are in the British Isles—all, except one, on the West Coast.

It has not been sufficiently insisted upon in works on natural history that nearly all birds have two geographical distributions varying according to the season, and to give a complete summary of their habitat, one must keep that for winter apart from that for summer.

*Distribution in Winter.**—The area occupied by the Gannet in winter greatly overlaps that which it occupies in summer; including not less than fifty degrees of latitude. but that is

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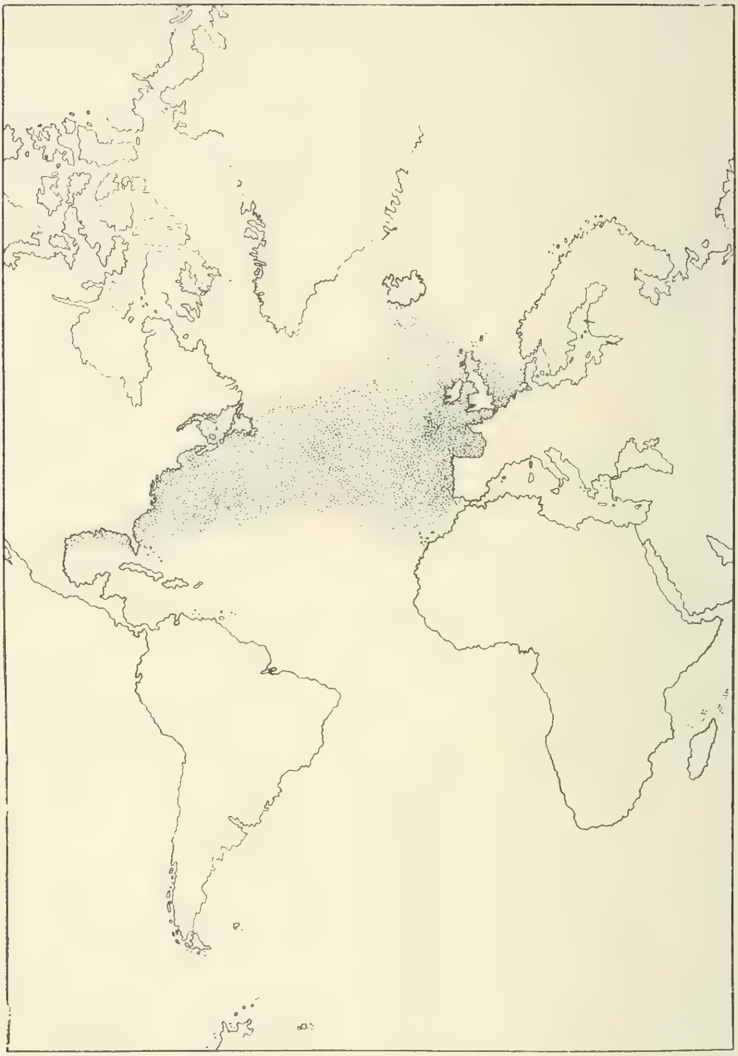
* Much account cannot be taken of strayed Gannets picked up in Belgium and France, *e.g.*, one at Toul (Godron), and two in January, 1877, in Sarthe (Gentil), and others in Germany, *e.g.*, in Hessen (A. G. Preuschen) and in Brandenburg. Dr. B. Borggreve says it has occurred at Neuwied, and three times in Munsterland ("Vögel F. V. Norddeuts.," 1869, p. 136), and H. Schalow cites one in Bohemia ("Journ. f. Orn.," 1876, p. 6). In Norway Prof. Collett reports one on Lake Slidre Fjord, Valders, another on Lake Store, Lee, and a third in April, 1892, on Lifjeld in Thelmarken. A Gannet was obtained in the Adriatic ("B. of Tunisia," p. 159), and another off Beirut ("Ibis," 1910, p. 491). Stragglers inland have been found at Michigan and Ontario ("Auk," 1906, pp. 275, 443).



AREA (DOTTED) OF DISTRIBUTION IN WINTER.

hardly a fair way of dealing with it. There must be two maps, which are necessary to show approximately what its distribution is at the two seasons. Though on both sides of the Atlantic the furthest winter range of the Gannet extends beyond the Tropic of Cancer, that cannot be regarded as its normal range. Mr. Meade-Waldo says it is occasionally abundant at the Canary Islands,* but it seems to be rare off the Azores† and Madeira, while it is more than likely that any Gannets seen off the Cape Verde Islands would be *Sula capensis*, the difference between them not being recognisable at a distance.‡

In the Straits of Gibraltar and vicinity I have taken pleasure in watching the Gannet, and on the testimony of several witnesses it is common there.§ On occasion it is reported to be extraordinarily abundant off the south of Portugal and Spain, especially in winter, and, in 1908, Miss Buxton saw large numbers at Cape St. Vincent as late in the spring as April 7th. When off the south of Spain, after gales in the autumn of 1880, Mr. Anderson passed through what he describes as "acres of Gannets,"|| and many more

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* "Ibis," 1893, p. 198. † "Novitates Zool.," XII., p. 110.

‡ Three or four Gannets at the Canaries had black tails ("Ibis," 1889, p. 508).

§ *Cf.* "Ibis," 1867, p. 430 ; 1871, p. 398 ; 1885, p. 249 ; "Orn. S. of Gib.," p. 207.

|| "Rep. Migr. of Birds," 1880, p. 90.

were seen on December 27th, 1882, and January 20th, 1884.* Mr. Boyd Alexander has recorded how, "on leaving Lisbon on December 20th (1897), the sea, as far as Corunna (about 250 miles), presented an extraordinary sight, for over its surface skimmed countless numbers of Gannets, which looked like innumerable moving specks of white in the far distance."† This extraordinary assemblage must have been composed entirely of adult birds, and such numbers were very noteworthy.

It is not infrequently met with in the western Mediterranean, and some have been obtained in Vaucluse, south of France (Guende et Reguis), and others near Hyères. It received admission into the Italian avifauna in 1877,‡ when a young male was killed in November; this, together with an adult, are in the museum at Florence, and it was not until 1898 that a third was taken.§ In Sicily it is less rare, and Mr. Whitaker has obtained both adult and young; he has also found immature Gannets to be not uncommon on the Tunisian coast.||

Many English observers have seen them in the Bay of Biscay, but they are apparently not common there, from

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* *l.c.*, 1884, p. 4.

† "Ibis," 1898, p. 285.

‡ "Ibis," 1881, p. 216.

§ "Ornis," 1899, p. 242.

|| "Birds of Tunisia," II., p. 158, and *cf.* "Ornis," 1903-4, p. 596.

what Mr. A. Granger has about them in his "Faune Orn. du Sud-ouest [de la France]," (1893).

As regards its northern winter limit, it is not easy to be precise. Numbers of Gannets have been occasionally seen at the Shetland Islands in December,[*] and at that season they are not infrequent on the coast of Ireland (R. M. Barrington), and may be looked for in the English Channel.[†] There are generally some in the North Sea. The late Henry Stevenson had known twenty or more to be brought into a Norfolk port in December, and several were seen as far east as the south-west coast of Sweden in January, 1884, and again in December, 1887,[‡] while according to Goebel it has even been seen at Varanger ("Zur Ornis Lapplands' und der Solowezkyschen inseln," p. 124).

On the other side of the Atlantic the Gannet is stated to go as far south as the Gulf of Mexico in winter, 2,500 miles from its Canadian breeding-places, and it has been identified at Trinidad,[§] but there *Sula leucogastra* takes its place, just as *Sula capensis* does in a corresponding latitude in the Old World. It is not very uncommon on the coast of Louisiana.[||]

Distribution in Summer.—In summer the Gannet's range

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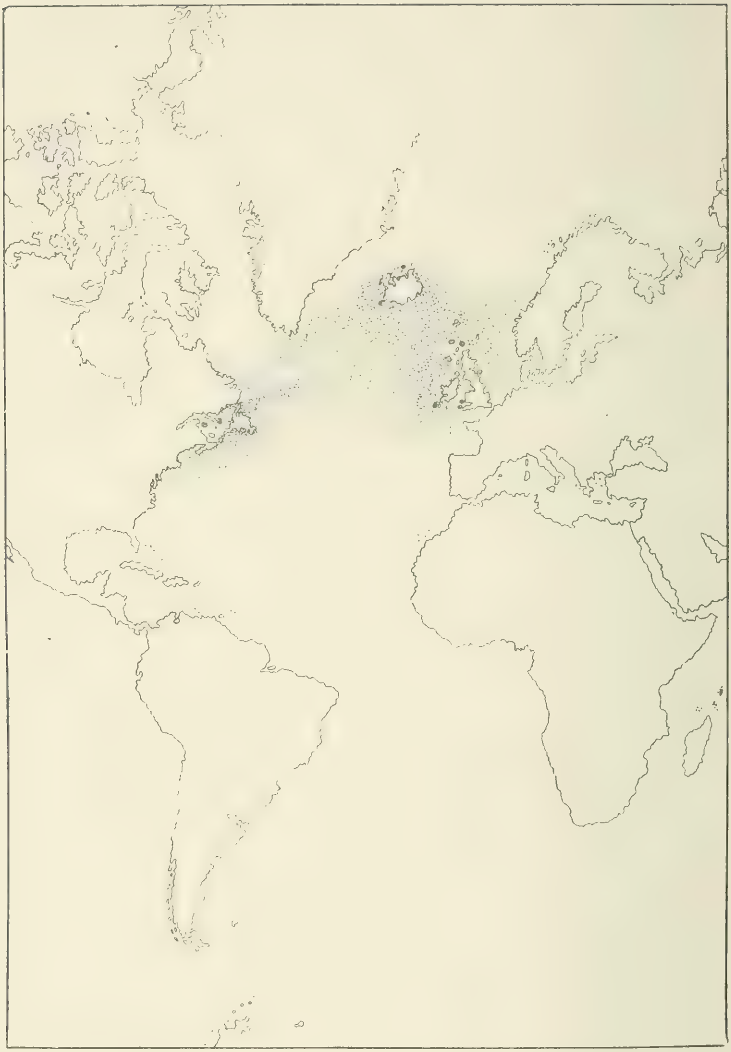
[*] "Zoologist," 1869, p. 1763.

[†] "Zool.," 1865, pp. 94, 98.

[‡] "O. K. der Ac. der Wissense," XVI., p. 51; XVII., p. 69.

[§] "The Field," April 17th, 1897.

[||] "Auk," 1907, p. 316.



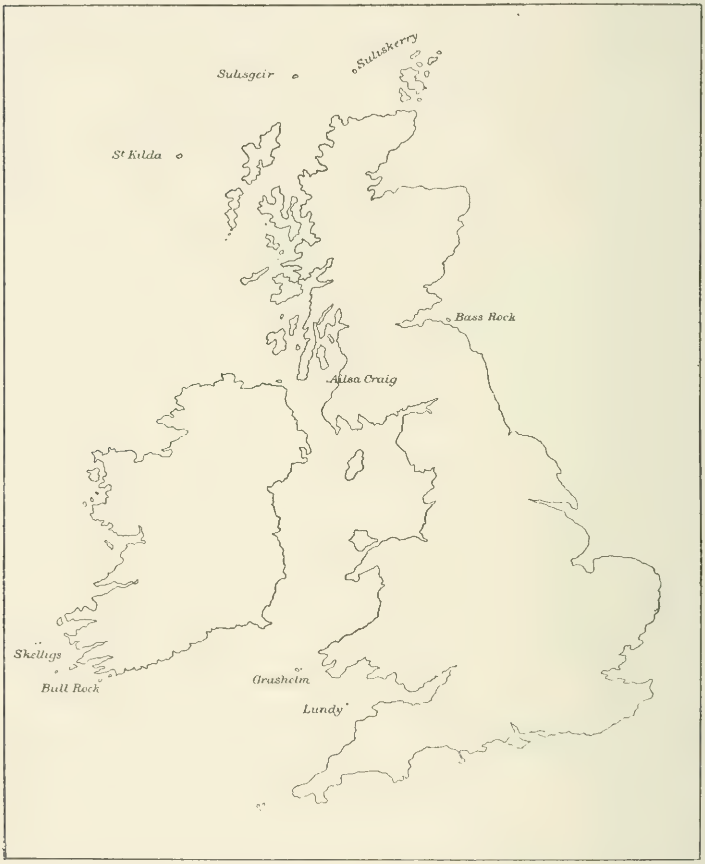
AREA (DOTTED) OF DISTRIBUTION IN SUMMER.

(Thickest at Breeding Places.)

is probably seldom further south than Lat. 45° S., and that only for non-breeders, but its northern limit reaches to within the Arctic Circle, for there is a breeding place on Grimsey Island off the north coast of Iceland. If it were not for that circumstance the area of its distribution would correspond with that accorded to the Great Auk. The Gannet's metropolis is St. Kilda, and its summer quarters may be defined as being the coasts of England, Scotland and Ireland, and more particularly the west coasts, as well as the rocky Feroe Islands and Iceland. On the coast of Norway it is never known to have bred, and very few, we are told by Professor Collett, ever proceed beyond the North Cape, but it has been recorded by Herr Goebel in Russian Lapland (*l.c.*), and has even received a Finnish name, according to Palmen. In the Baltic it is but a straggler.

As regards America, there are now two "Gannetries," if it be allowable so to term a Gannet camp (instead of five as formerly)—both in the Gulf of St. Lawrence, Canada, which will be described in Chapter VII. I learn from Mr. C. Helms that, though sometimes seen in Davis Straits, the Gannet is only a straggler to Greenland itself, and that only five examples are known to him, viz., one from north and four from south Greenland, and two of these were found drifting dead on the sea; very possibly they belonged to one of the Icelandic settlements.

One peculiarity of the Gannet is the small number of its breeding resorts, which politically are all in the realms of


Sulisgeir
Suliskerry
St Kilda
Bass Rock
Ailsa Craig
Skelligs
Bull Rock
Grasholm
Lundy

BREEDING PLACES OF THE GANNET IN THE BRITISH ISLES.

two monarchies; another great feature is the fidelity with which it adheres to them, for no breeding-place is known for certain to have been ever voluntarily abandoned. Briefly they are as follows :—

England.—Lundy (but this, it is to be feared, is for the present forsaken).

Wales.—Grasholm, on the coast of Pembrokeshire.

Ireland.—The Bull Rock ; The Skelligs.

Scotland.—The Bass Rock ; Ailsa Craig ; St. Kilda Islands ; Sulisgeir (or North Barra) ; The stack of Stack and Skerry.*

Feroe.—Mygganaes.

Iceland.—Sulusker ; Eldey ; Grimsey.

Canada.—Bird Rocks ; Bonaventure.

It certainly is not a little singular that all the breeding-places in the British Isles should be on the west coasts, except the Bass, as well as one at Feroe and two in Iceland, but the west coast is more rocky than the east, and there are more islands there, which is what Gannets love, indeed so strong is their predilection for islands that not a single settlement is known to exist on the mainland.

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* Marked by error on the map as Suliskerry.

CHAPTER III.

LUNDY, GRASHOLM, AND SKELLIG.

Lundy Island—Notices of its "Gannetry" in Rolls of the Thirteenth Century—Its disastrous Modern History—Grasholm on the Welsh Coast—Its Origin not known—Irish Stations—The Little Skellig—The Bull Rock—The latter known to have been used in 1853.

Lundy Island.

Its Early History.—Lundy Island is off the north coast of Devonshire, and naturalists are indebted to the learned researches of G. S. Steinman* and T. D. Hardy for unearthing some exceedingly early notices of Gannets breeding there.† These accounts are found in certain

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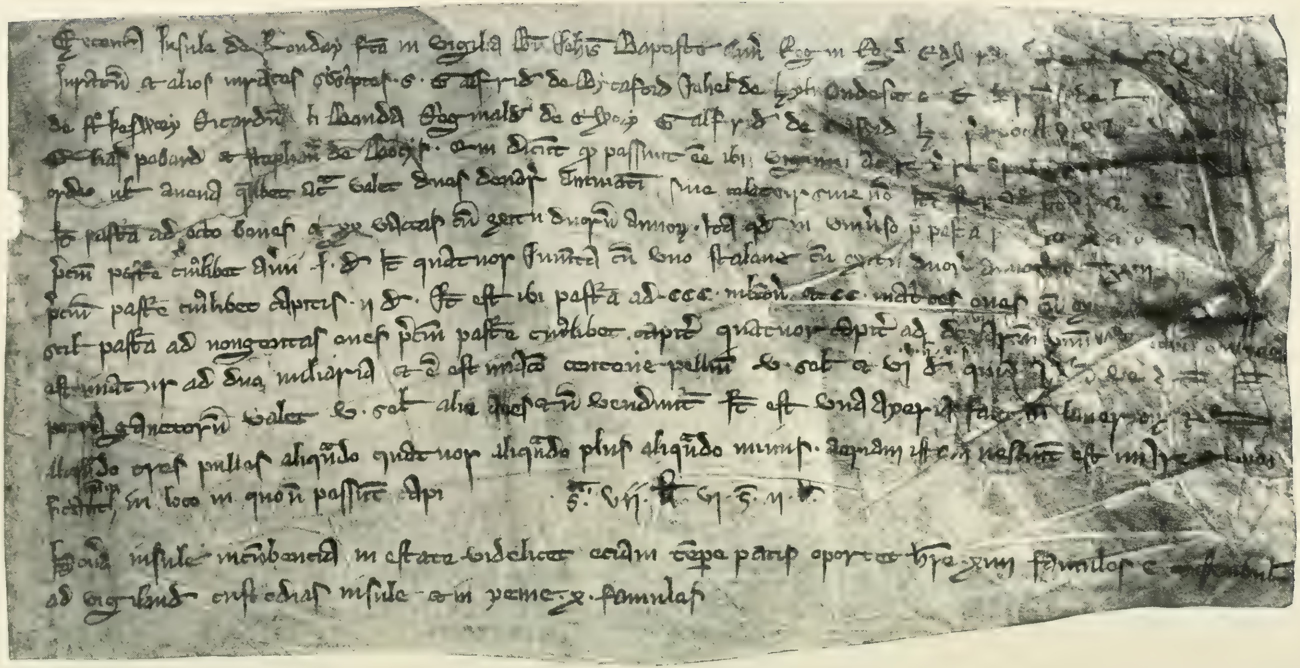
* "Some Account of the Island of Lundy," by G. S. Steinman. "Collectanea Topographica et Genealogica," 1837, IV., p. 313–330." It is very probable that further search among Patent Rolls and Hundred Rolls and Inquisitions taken at the deaths of the different lords of Lundy, upon what fell to the lord within his manor by forfeiture, would reveal other early references to the birds of this island.

† The late Mr. H. Saunders quotes the antiquary Leland as mentioning Gannets which bred on Lundy in the time of Edward II. ("Brit. Birds," III., p. 157), but the only passage discoverable in Leland which refers to Lundy Island ("Collectanea," Hearne Coll., II., p. 416) says nothing about the birds there.



EXTENT OF THE ISLE OF LUNDY, 1274.

[*Face page 43*

"Extents," or "Inquisitions" (*literally* "inventories") contained in ancient rolls of the time of Edward I. and Edward II. Thanks to Dr. Birch, of the British Museum, who indicated their probable whereabouts, I am able to say that the original rolls are quite safe, and are preserved at the Record Office, and through him I obtained permission to have certain passages copied by Miss E. M. Thompson, in whose autograph, for the sake of accuracy, they are here presented.

Translation by Mr. Steinman of an Extent made in the reign of Edward I. (see Plate).

". . the taking of rabbits is estimated at 2,000, £5 10s., and the estimate is at 5s. 6d. each hundred skins, because the flesh is not sold. Also the rock of Gannets is worth 5s., other birds, but they are not sold. There is also one eyre of butcher falcons* which have sometimes three young ones, sometimes four, sometimes more, and sometimes less. This eyre the jury knew not how to estimate, and they build their nests in a place in which they cannot be taken."

On the back of the "inquisition" it is recorded that "all these things may be considered of such value to the keepers of the island, as to lessen their wages to the extent of 5s., and the fowls beside, although they cannot be sold, nor are the keepers willing to eat them . . . yet he estimated them at 40d."*

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* *Falco peregrinus* no doubt.

The date of this "inquisition" is 1274, and it affords the earliest documentary evidence there is relating to any Gannets' breeding-place, preceding the first record of the Bass Rock by about 150 years, and thus its interest is not easily over-rated.

We next learn from Steinman's researches that in 1321, during the reign of Edward II., owing to Marisco's acquiring or recovering Lundy, an inquisition of what was on the island had again to be made, and again the Gannets come in for mention.

Translation of the Inquisition by Mr. Steinman.

"There is also a rabbit warren worth in ordinary years 100s., but this year destroyed in great part by the men of John de Wylyngton and the Scots. Also a certain rock called the Gannets' stone, with two places near it where Gannets settle and breed, worth in ordinary years 66s. 8d., but this year destroyed in part by the Scots. Also eight tenants, who hold their land and tenements by a certain

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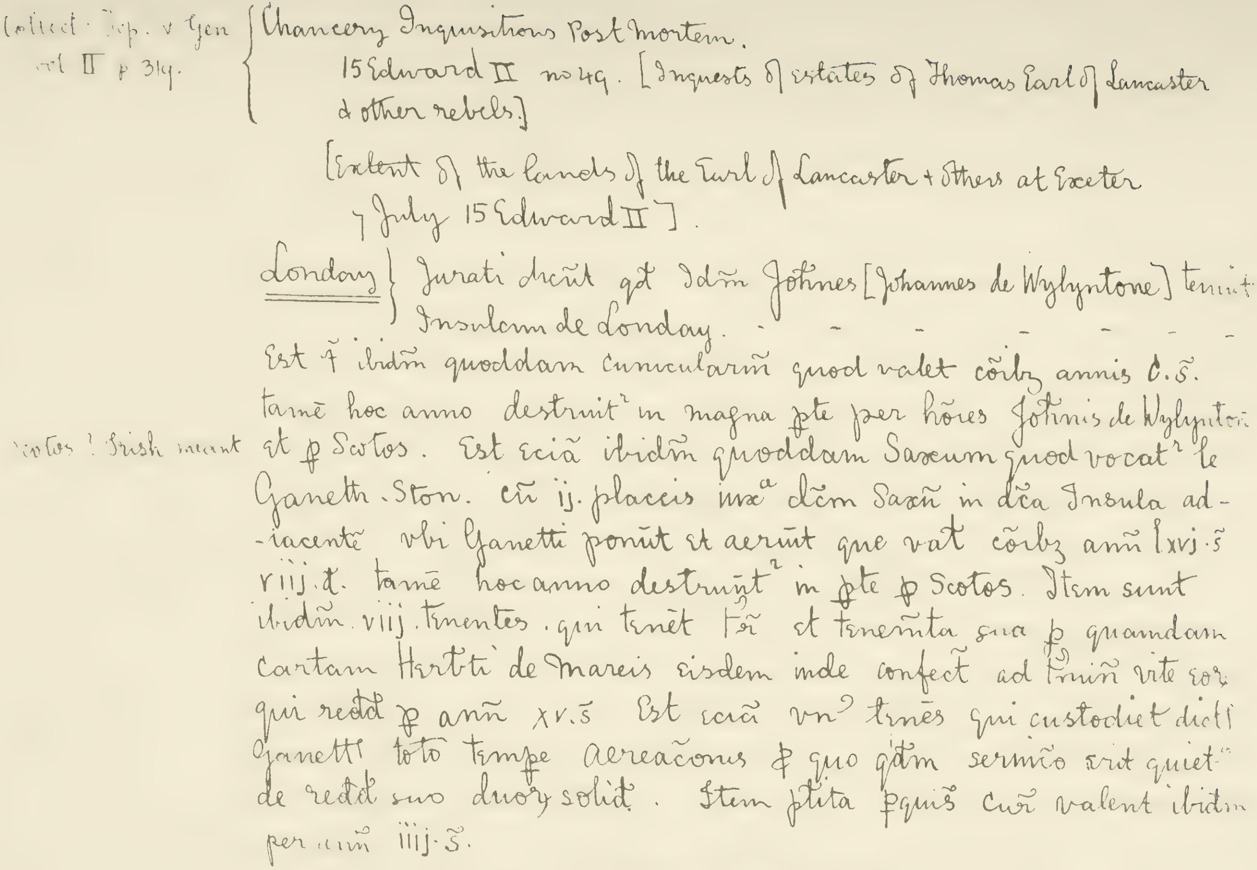
* "Coll. Top. et G.," IV., p. 317. In nearly every other place young Gannets and Puffins were looked upon as fit human food at a later date.



Collect. Top. & Gen vol II p 319.

Chancery Inquisitions Post mortem.
15 Edward II no 49. [Inquests of estates of Thomas Earl of Lancaster & other rebels]

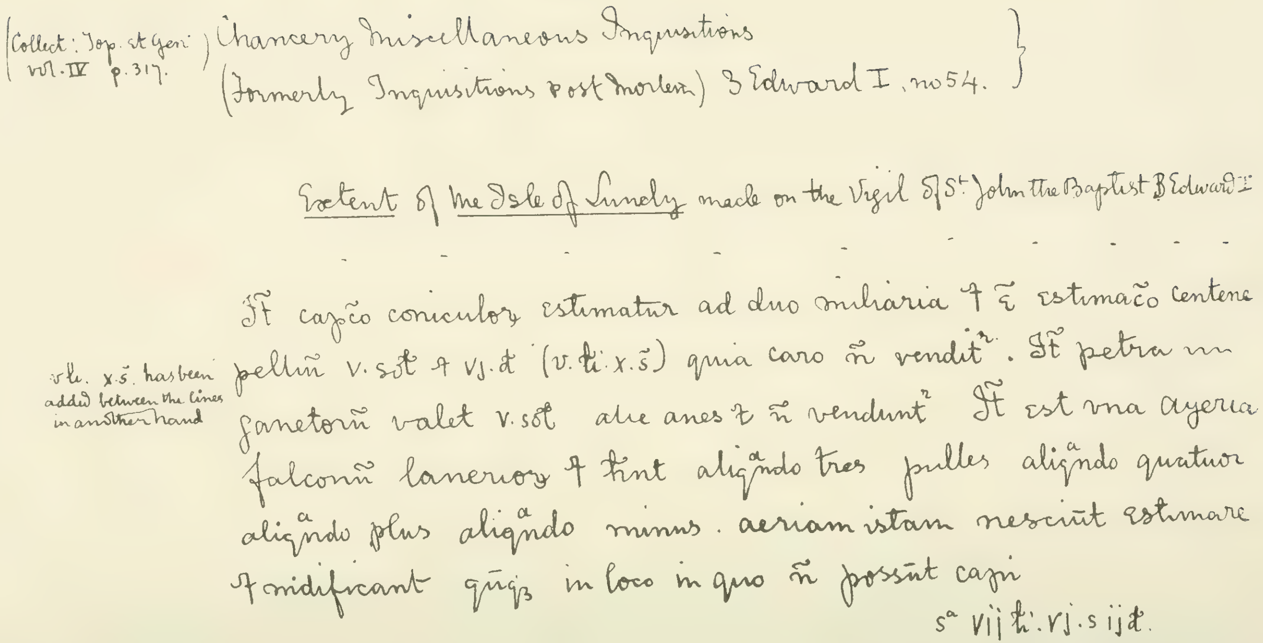
[Extent of the lands of the Earl of Lancaster + others at Exeter
7 July 15 Edward II].

Londay } Jurati dicūt qd Idm̄ Johnes [Johannes de Wylyntone] tenuit
Insulam de Londay. - - - - - - -
Est & ibidm̄ quoddam cunicularĩ quod valet cōibȝ annis C.s̃.
tamē hoc anno destruit' in magna pte per hōies Johnis de Wylyntoñ
et p Scotos. Est eciā ibidm̄ quoddam Saxum quod vocat' le
Ganeth. Ston. cū ij. placeis iuxa dcm Saxū in dc̄a Insula ad-
-iacentē ubi Ganetti ponūt et aerūt que vat cōibȝ ann̄ lxvj.s̃
viij.d. tamē hoc anno destruūt' in pte p Scotos. Item sunt
ibidm̄. viij. tenentes. qui tenēt terr̄ et tenemēta sua p quandam
cartam Herbti de Mareis eisdem inde confect ad t'miñ vite eor
qui redd p ann̄ xv.s̃ Est eciā un' tenēs qui custodiet dicti
Ganetti toto tempe aereacōnis & quo qdm servicio erit quiet'
de redd suo duor solid. Item ptita pquis' Cur valent ibidm
per ann̄ iiij.s̃.

Scotos ? Irish meant

INQUISITION P.M EDWARD I

Face page 11



(Collect: Top. et Gen: vol. IV p. 317.) Chancery Miscellaneous Inquisitions (Formerly Inquisitions post mortem) 3 Edward I, no 54.

Extent of the Isle of Lundy made on the Vigil of St. John the Baptist 3 Edward I

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It' capc̃o coniculoꝝ estimatur ad duo miliaria ⁊ ẽ estimac̃o centene pelliũ v. sol ⁊ vj. d (v. li. x. s̃) quia caro ñ venditr. It' petra in fanetoriũ valet v. sol alie aves ⁊ ñ venduntr It' est vna ayeria falconũ laneriorꝫ ⁊ hnt aliqͣndo tres pulles aliqͣndo quatuor aliqͣndo plus aliqͣndo minus. aeriam istam nesciũt estimare ⁊ nidificant quiqꝫ in loco in quo ñ possũt capi

sa vij li. vj. s iij d.

v li. x. s̃. has been added between the lines in another hand

INQUISITION P.M. EDWARD II.

[Face page 45]

charter of Herbert de Mareis,* granted them for the term of their lives, who pay 15s. yearly. Also one tenant who should keep the said Gannets during the whole of the season of their breeding thereon, for which service he will be quit of his rent of two shillings. Also pleas and perquisites of courts worth yearly 4s."†

In the forty-seven years since the previous "extent" was made in 1274, the value of the Gannets had increased. Perhaps it had been discovered in the interval that they were an edible commodity, for a person is expressly designated to look after them; at any rate the Gannets' stone, before assessed at 5s., is now valued at 66s. and 8d.

Four years later—1325 or 1326—Edward II., in order to avoid his queen and barons, thought to take refuge on Lundy Island, and again a third inventory, though a brief one, was made, which gives Gannets among the island's products.

"Cuniculos producit copiose, columbas, et struconas, quas vocat Alexander Necham (Nechristum) Ganymedis aves, indies (nidos) habet prægnantes." ("Vita et Mors Edwardi Secundi," by Thomas de la Moore.)‡

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* Or Marisco, a descendant of William de Marisco, who was lord of Lundy in 1199 (Steinman *l.c.*).

† Inq. 15, Edw., No. 49.

‡ Extracted from "The Chronicles of the Reigns of Edward I. and Edward II.," Vol. II., p. 309.

In the "Annals of England," by John Stow (1631), the passage is rendered :—

"It bringeth forth Conies verie plentifull ; it hath pigeons [? *Columba livia*] and other Foules, which Alexander Necham calleth Ganimedas birdes, having great nestes."*

For a long interval after this there seem to be no more Gannet memorials in connection with Lundy. Willughby and Ray evidently were not aware of this station, neither did Montagu know of it, though a Devonshire man, nor is there anything concerning Lundy Gannets in Camden's "Britannia." That they continued breeding there we may look upon as almost certain, but it is not until 1830 that we find their doing so confirmed by Dr. E. Moore on the faith of Mr. Comyns.* In 1787, a visitor to Lundy, whose name is lost, kept a journal which, being deemed noteworthy, was in 1824 partly printed in the "North Devon Magazine" (p. 54); curiously enough this diary does not say a word about Gannets, though it tells of the great quantities of "Parrots," Muirrs" of two sorts (Guillemots and Razorbills), and small Gulls netted by the inhabitants. Comyns, however, was a naturalist, and his name, frequently mentioned by

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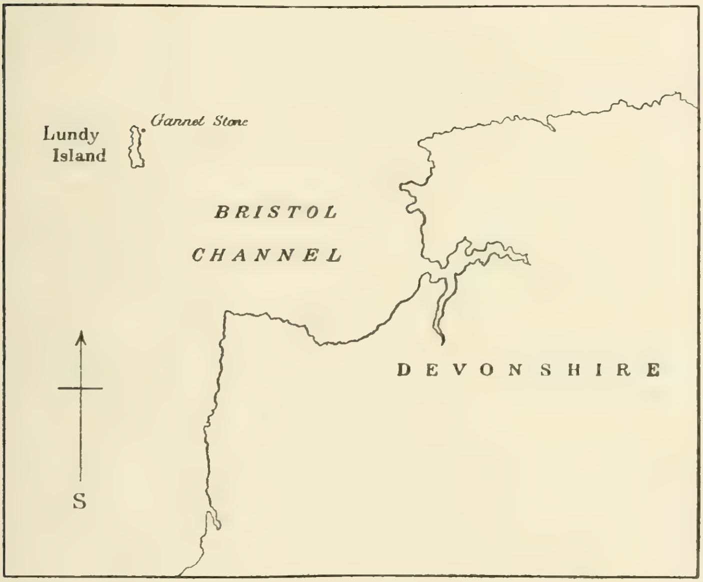
* No passage of the kind alluded to seems to be in Necham's "De Naturis Rerum," and it therefore must be sought in some other of his writings. It may be remarked that "Foules" is not a literal translation of the word "struconas," and Professor Newton thought it should be "struthonas," observing that the *c* and *t* are often indistinguishable in old MSS., and *t* very often written for *th* (the *h* being silent). Professor Skeat observes also that the Greek *στρουθος* (whence *στρουθίων*) was vaguely used, for all sorts of birds, from the Sparrow to the Eagle. Three hundred years later, the poet Michael Drayton (quoting Steinman, tells us, *l.c.*, p. 330, from Baker, the Latin translator of De la Moor's "Life of Edward II."), returns to the subject in his "Polyolbion," and versifies the birds of Ganymed, which bred on Lundy Island, thus :—

> "This Lundy is a nymph to idle toys inclin'd
> And all on pleasure set, doth whollie give her mind
> To see upon her shores her fowl and conies spread,
> And wantonly to hatch the birds of Ganimed."
> Song IV. ; u. 11-14.

Ganymede, in mythology, was changed by Jupiter into an Eagle, according to some, which may have led Necham, by a stretch of thought, to use this name for the Gannet (Newton *in litt.*).



LUNDY ISLAND.

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* "Trans. Plymouth Inst.," 1830, p. 341.

Moore and Montagu, is sufficient guarantee, but it looks as if the Gannet was not very abundant on Lundy in his day. Bellamy* speaks of Gannets breeding in 1839 on Lundy Island.

Its Modern History.—Turning now to the modern history of this settlement, the story of Lundy Island is a sad one —really too much so for a naturalist to dwell on, when one thinks what might have been done, and was not done, for the preservation of the Gannets in this their time-honoured home.

At one time, we are told by Messrs. D'Urban and Mathew, the authors of "The Birds of Devon," there were nearly seventy nests, and this as recently as 1889,† yet this may be an error, for in 1887 there seem to have been only sixteen nests,‡ according to Mr. Howard Saunders, who stayed on the island, and therefore had every opportunity of ascertaining their number. It is impossible now to say what was the maximum number of nests reached at Lundy; it is unlikely that it was ever a very large settlement, but Mr. Hudson Heaven, the proprietor of the island, can recall the time when there were some score of nests. About 1890 or 1891 Mr. Heaven's tenant, Wright, told the Rev. M. A. Mathew § that he did not think a young Gannet had been reared on Gannet Rock for seven years, such was the constant and inconsiderate persecution to which they were already being subjected. In 1893 there were about thirty pairs of old birds, as Mr. F. L. Blathwayt was informed when there on a subsequent visit,* and these, being incessantly disturbed and their eggs taken, had tried to establish themselves on Lundy itself, as more likely to afford them a home. In 1896 there was a gleam of hope for the unfortunate Gannets, the eggs of all wild birds breeding upon Lundy Island receiving protection by order of the County Council, and in 1897 a further order included the Gannets themselves. But these attempts at legislation were too nominal to prove effectual in the case of the Gannets, whatever they may have done for the Puffins and Guillemots, there being no one appointed to see that the law was carried out, which, as was to be expected, became a dead letter. In 1900 Mr. Blathwayt, visiting Lundy, found only three pairs of Gannets which had forsaken Gannet Rock, and were breeding three-quarters of a mile away at the extreme north-east end of the island near the lighthouse,† but it is believed no young were reared. In 1901 the principal of the lighthouse reported seven pairs, but whether they all had eggs I was not told; if they had probably they were robbed.

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* "Nat. Hist. S. Devon," p. 218

† "Birds of Devon," p. 177.

‡ "Ootheca Wolleyana," II., p. 457.

§ *l.c.*, p. 177.

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* "Zoologist," 1900, p. 375.

† *l. c.*, p. 376.

In 1902 I had no report from the lighthouse, but in 1903 I learnt from Professor Newton, who was in communication with Mr. H. B. Elton, that the latter had found five pairs of Gannets nesting in a cove below the lighthouse, and that, in spite of its precipitous nature, he had been shown their five eggs which had been all taken! In 1904, according to the lighthouse keeper, no eggs were laid by the worn-out and disturbed birds, in spite of the quiet now ensured by a watcher put on by the Society for the Protection of Birds, at the instigation of Professor Newton.* Nor were there any eggs, Mr. Elton tells me, in 1906 or in 1907, although the Gannets returned as usual, and so ends for the present the story of this settlement.

Lundy, as already stated, is the oldest known Gannet station in the world, once honourably protected, but it has evidently since 1883 been one of the most persecuted. Devonshire naturalists think that in consequence most of the Gannets have gone to Grasholm, on the Welsh coast, but there also they have not been free from persecution. That some would come back to Lundy if the place were sufficiently protected can hardly be doubted, for a site occupied by birds so attached to their homes as Gannets for nearly 700 years is not easily forsaken. It is earnestly

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* See the Society's "Bird Notes and News," October, 1904, and their "Report," 1905, p. 7.

GANNET ROCK, LUNDY ISLAND.

to be hoped that so desirable a result may yet be brought to pass, but unless local sympathy is aroused for the birds, not much can be done.*

I am very much obliged to Mr. H. B. Elton for the view of Gannet Rock, and for much information about its Gannets.†

Grasholm Island.

Modern History.—Grasholm, on the coast of Pembrokeshire, South Wales, is the next settlement to be considered, and here again there has been a good deal of regrettable taking of both eggs and birds. The island, which is twenty-one acres in extent and uninhabitable, is the property of Lord Kensington, and is let to Mr. J. J. Neale, who does all he can to protect the birds, and has obliged me with some particulars. He reports that very few young Gannets were reared in 1905, but in 1906 about a hundred to a hundred and thirty got off, and in 1907 three hundred: one reason for this difference was that the bad weather in 1907 prevented fishermen and others landing on the island and disturbing and molesting the birds.

On the north the island is precipitous, and it is there that the Gannets breed, some of them on a rock marked in the Ordnance Survey as the West Tump, and others along the cliff. Mr. Q. E. Gurney and I sailed round the island twice in July, 1903, but it was too rough to land,* at which we were naturally much disappointed, after having waited a

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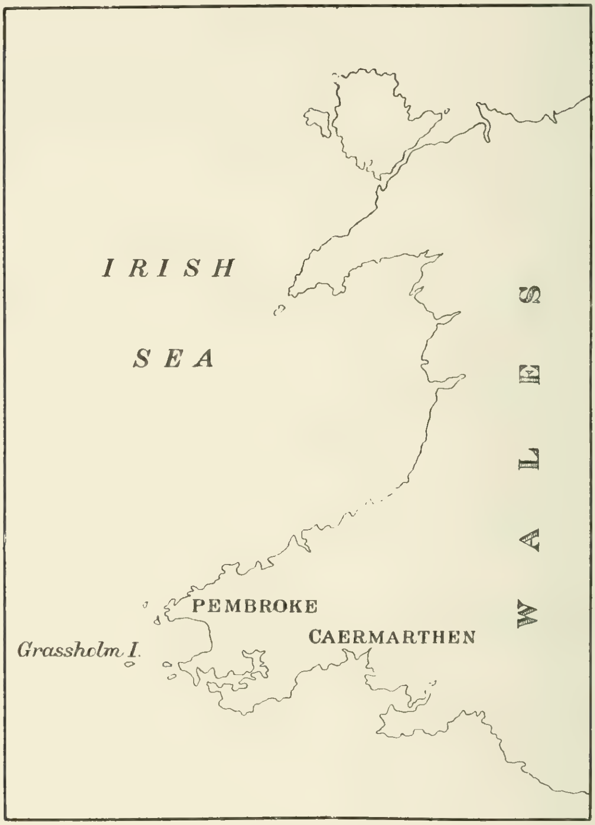
* "With the Gannets," writes Mr. Heaven, "have also vanished the Choughs, which at one time were numerous," but in 1887 were already very rare (*cf.* "Manual of British Birds," p. 231).

† A useful general account of Lundy, entitled "A Monograph, descriptive and historical" (n.d.) was published by the late Mr. J. R. Chanter.



GRASHOLM.

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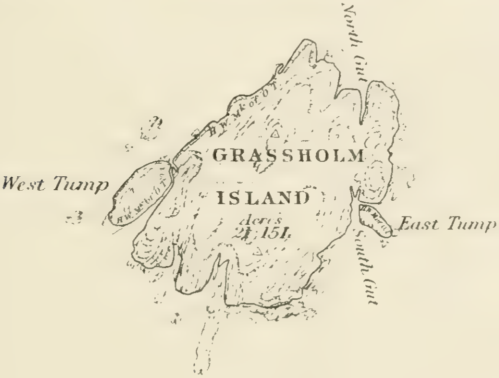
* Some account of what we saw has already been published in the "Norwich Nat. Tr." (VII., p. 633); the island is best reached from Milford Haven, but permission is required from the tenant to land.

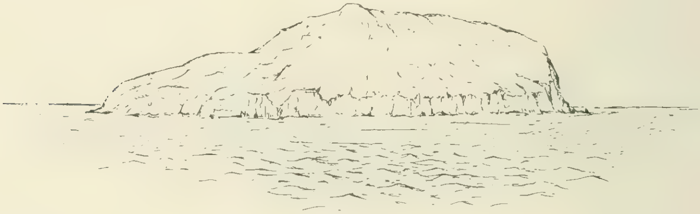
week for a fine day, but the calmest weather is necessary for a successful visit. The chief company of Gannets nidify on the north side of Grasholm island, where in one place the cliff, which is not very high, terminates in a convenient table-like top, occupied by at least one hundred Gannets: further on we observed five smaller companies, averaging forty Gannets each, as well as three or four smaller parties of eight or ten. As far as we could see, every Gannet on the island was in adult plumage, but seven or eight piebald ones were flying around, being in much the same proportion as at Ailsa, and the Bass Rock, viz., about one piebald bird to fifty adults. Judging from one of my tame ones, which went through a succession of changes to be described later on, these piebald Gannets must be from twelve to twenty-six months old, according to the amount of white on them, but



GRASHOLM.

some with very little black left in their plumage may be three years old.*

Little more remains to be said about Grasholm Island, as its settlement of Gannets has no early history, there being no books bearing on the subject, or travellers' journals from which quotations can be taken. Local enquiries also have failed in eliciting much as to its age. However, one old fisherman, John Wats, could certify to Gannets on Grasholm for over forty years, while another very old inhabitant, Mr. Williams, of St. David's, remembered his father-in-law, Henry Bowen, telling him there were Gannets, but not many, on Grasholm, as far back as 1820. There can be little doubt that Gannets were there before that time, yet Grasholm may have been forsaken awhile, and then re-occupied by a contingent from the harassed community at Lundy, only forty miles away. The fact of Ray and



GRASHOLM.

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* It would be a very exceptional thing to see a young Gannet which was still black all over at Grasholm or any other station in June or July, because this phase of plumage is not retained more than ten months.

GRASHOLM.

Willughby having been at St. David's in June, 1662, on one of their Itineraries, and not mentioning this Gannetry, is really of no weight, for they are equally silent about Lundy Island and Ailsa Craig, and, indeed, their minds seem to have been more occupied with botany than birds.

With regard to its bird population, in 1886 Mr. M. D. Propert assessed the Grasholm community of Gannets at 500, and in 1893 Mr. Robert Drane, of Cardiff, considered there were about 240 nests,* which would mean nearly 600 Gannets. Doubtless the number is not always the same, and I am disposed only to reckon it at 400 in 1903, yet it is probable from what Mr. Neale says that, like the Irish Gannetry to be next mentioned, it has increased since then.†

For a very good account of the Birds of Grasholm, originally spelt Grasse (*i.e.*, grass) Holme,‡ see an article by Mr.

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* "Cardiff Naturalists' Soc. Tr.," 1893-4, p. 7. Mr. Drane's estimate is confirmed by Mr. C. Jefferys (*in litt*).

† Besides Gannets, there used to be immense numbers of Puffins (but Mr. Drane says they have now nearly deserted the place) and a fair quantity of Guillemots and Kittiwake Gulls breeding on Grasholm. Mr. Drane also found the Turtle Dove breeding there, which is the more remarkable because there is not a tree or bush on the island, nor any fresh water, in lieu of bushes he thinks the Turtle Doves use Puffin holes, which he saw them enter. Formerly, he adds, there was hardly a plant of grass upon Grasholm, for the Puffins had so mined its shallow soil that it gave way at every footstep, and was so dry that nothing but the Tree Mallow and an *Atriplex*, with a few marine plants, grew upon it.

‡ Leland, "Itinerary," XXVII.

Robert Drane, in the "Transactions of the Cardiff Nat. Soc." (1890–1, continued 1893–4), and I am indebted to the author for supplementing it with further particulars. Writing under date of August 3rd, 1903, he says: "I have visited the island three times within the last ten years. . . . On one of my visits I found one of the three Gannet colonies there quite deserted in the height of the breeding season, while that next it, say 400 yards away, was in full swing. Every nest was deserted, and in ruins, although of that season's occupation. . . . Epidemic disease suggests itself as a reason."* The late Mr. E. T. Booth ascertained, from watching some Gannets which bred in confinement, that both sexes take part in the labours of incubation, taking turns to sit on the eggs: that that was so was also believed in the seventeenth century by Martin Martin, to whom the islanders of St. Kilda had communicated it, but Mr. Drane has gone a step further in proving that both male and female feed the young. On one occasion a Gannet fed its downy offspring in his presence, then brooding it, when a second Gannet came and fed the same young one,† after displacing what was presumably its other parent (*l.c.*, p. 60).

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* Mr. Drane remarks, "It is certain that the Manx Shearwater dies in autumn from some not obvious cause. In September, 1908, hundreds lay dead on Skomer island." This may have been due to an epidemic.

† Mr. Drane writes me that this has happened since on more than one occasion.

The Little Skellig.

Its Early History.—There are, and possibly have been for centuries, two nurseries of the Gannet in Ireland, and, as far as we know, two only—the Little Skellig and the Bull, both of them island rocks, and both on the south-west coast.* Much the larger of the two, and, as far as we have any cognisance, the older, is the Skellig, which stands out lofty and jagged on the rock-bound coast of Kerry, some seventeen miles north-west of the Bull. The approach to the Skellig from Port Magee, a village where there is a small fish-curing industry, cannot fail to be impressed on the memory of any who have been there. So will the view of the twin Skelligs from Puffin Island,* which is nearly half-way. Seen from

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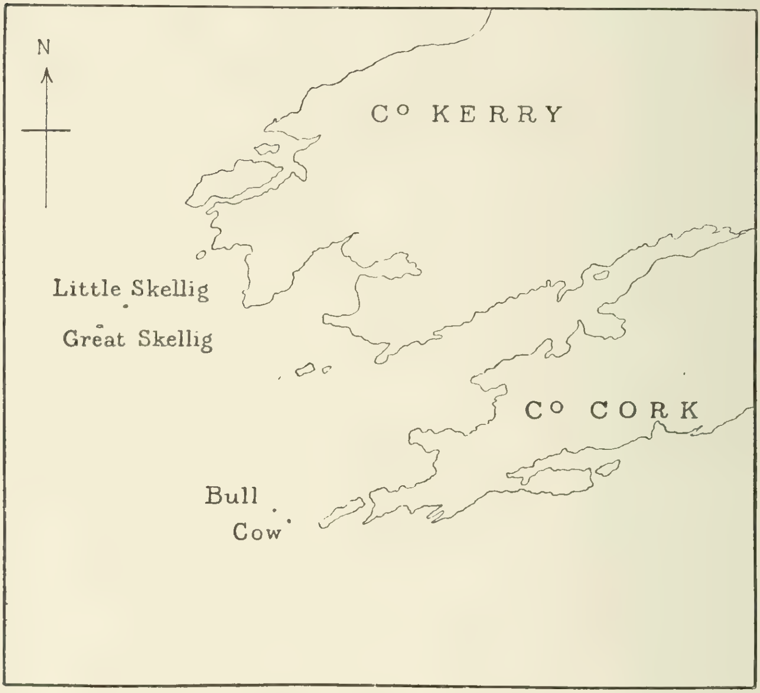
* The learned Sylvester Giraldus, who wrote a History of Ireland in the XIIIth Century, speaks therein of various birds, and amongst them of a white Goose, called a "Gante." Whether he had the real Gannet in his mind is very doubtful, especially as we know that "Gante" was used in "Rolls of Normandy" of the XIIIth Century for a Goose. Mr. Montague James informed the late Professor Newton that "Ganta," judging from Ducange, meant simply Wild Geese, *anseres silvester* or *aucae silvester*, and not Gannets. Giraldus' words are :—"Aucæ minores albæ qui et Gantes dicuntur et gregatim in multitudine magnâ, et garrulâ venire solent, in hos terrarum fines rarius adveniunt, et tunc valde raræ" ("Top. Hib.," I., Cap. XXIII., edited by J. F. Dimock). *Translation.*—The smaller white Geese, which are also called Gantes, and which are wont to come by flocks in a great and noisy multitude into these remote parts of the earth, appear but seldom, and indeed very few at a time." At first sight one would not think the word "Gantes" to mean here Wild Geese, *e.g.*, *Anser albifrons* or *A. segetum*, because in the next paragraph Giraldus makes mention of these as the larger Geese, commonly called *Brisiæ*, or *Grisiæ*, *i.e.*, Grey Geese ; yet it must be admitted the description is not applicable to the Gannet, and in all probability was not intended for it.

Giraldus has many other allusions to Irish birds in his writings, as well as to Welsh ones, but a recent commentator on Irish zoology sets him down as a credulous man (Harting, "Essays on Sport and N. H.," p. 297), whose natural history is not to be relied on.



THE SKELLIG ROCKS.

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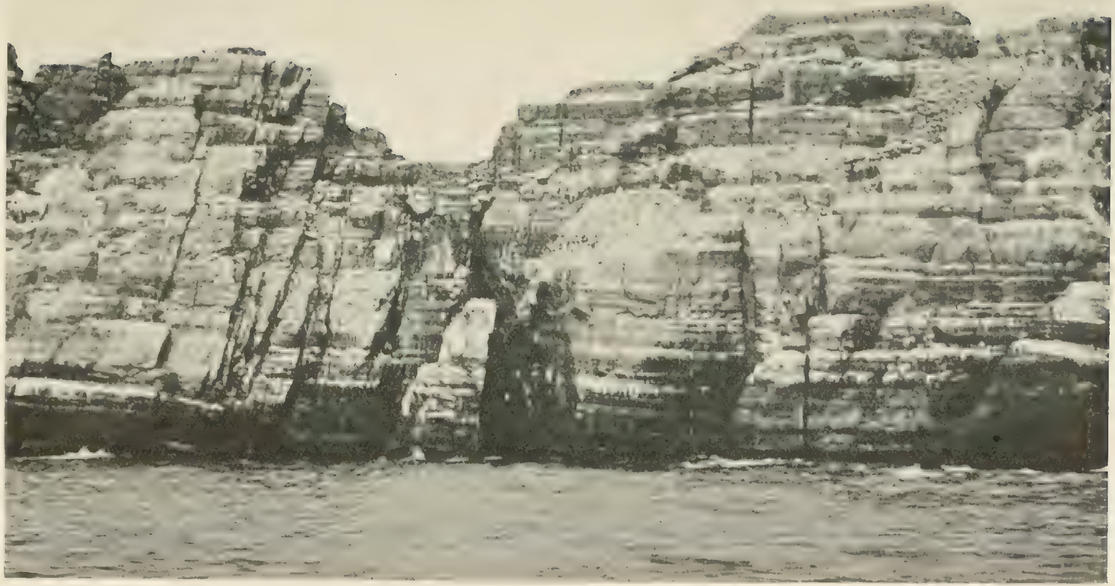
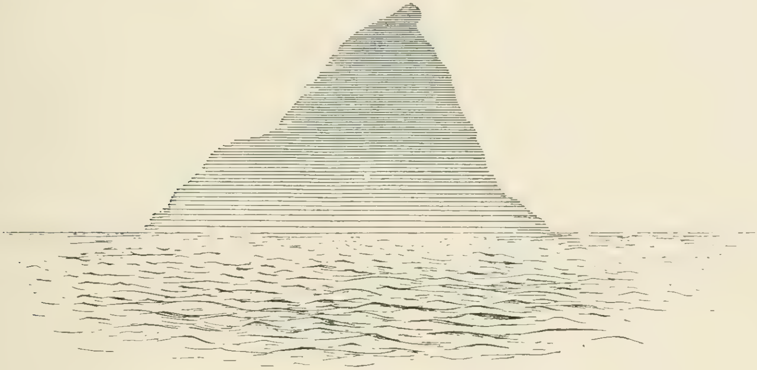
* Puffin Island hardly deserves its name, for there are no longer abundance of Puffins, but, as we were told, many Manx Shearwaters. A pair of the Greater Shearwater were seen at sea the day before our visit (April 9th) by the boatmen, who described them.



THE LITTLE SKELLIG.

here, the Little Skellig stands out grandly pyramidal, rearing its tall head 445 feet into the blue vault of Heaven, a beacon seen from afar, on which I longed to land, but weather forbade our getting beyond Puffin Island.

We have it on the authority of an Irish historian of eminence, Charles Smith, that Gannets were breeding here about 1748,* and this is confirmed by Richard Pocock, Bishop of Meath, who had himself been on the Skelligs,† but no doubt this community of birds is far older than 1748.



LITTLE SKELLIG FROM N.E. (5 MILES).

Its Modern History.—The next we hear of the Skellig is in 1828, when Professor Fleming, in his "British Animals," speaks of the Gannets there, but he may be merely repeating Pennant. The first we learn about numbers is that in 1850 there were about a thousand,* but in 1880 Mr. R. M. Barrington thought there were but sixty Gannets,† a great falling off. In 1882 Sir R. P. Gallwey raises the number to three hundred.‡ In 1884 Mr. Barrington found it was still increasing,§ while in 1890 Mr. W. H. Turle even thought there were then several thousand pairs of Gannets.‖ In 1896 Mr. A. D. Sapsworth, in an article from which I will make a short extract, assesses the settlement at some thousands.¶ Ten years later, and Mr. Barrington re-visiting the Skelligs, puts the Gannets at from 15,000 to 20,000,** an increase, perhaps, in part due to the cessation of the harvesting of the young at St. Kilda, and one which in 1908 I found the Portmagee fishermen all confirmed ; I was glad to find they did not harbour any resentment to the birds on the ground of their proving fishing rivals.

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* "State of Kerry," 1756.

† *cf.* Pennant's "British Zoology," ii., p. 614. I have not been able to consult Pocock's "Tour in Ireland."

Mr. Sapsworth writes of this Gannetry, that it " looks like a huge conical beehive swarming with bees ; they arrived from all directions only to depart again on another

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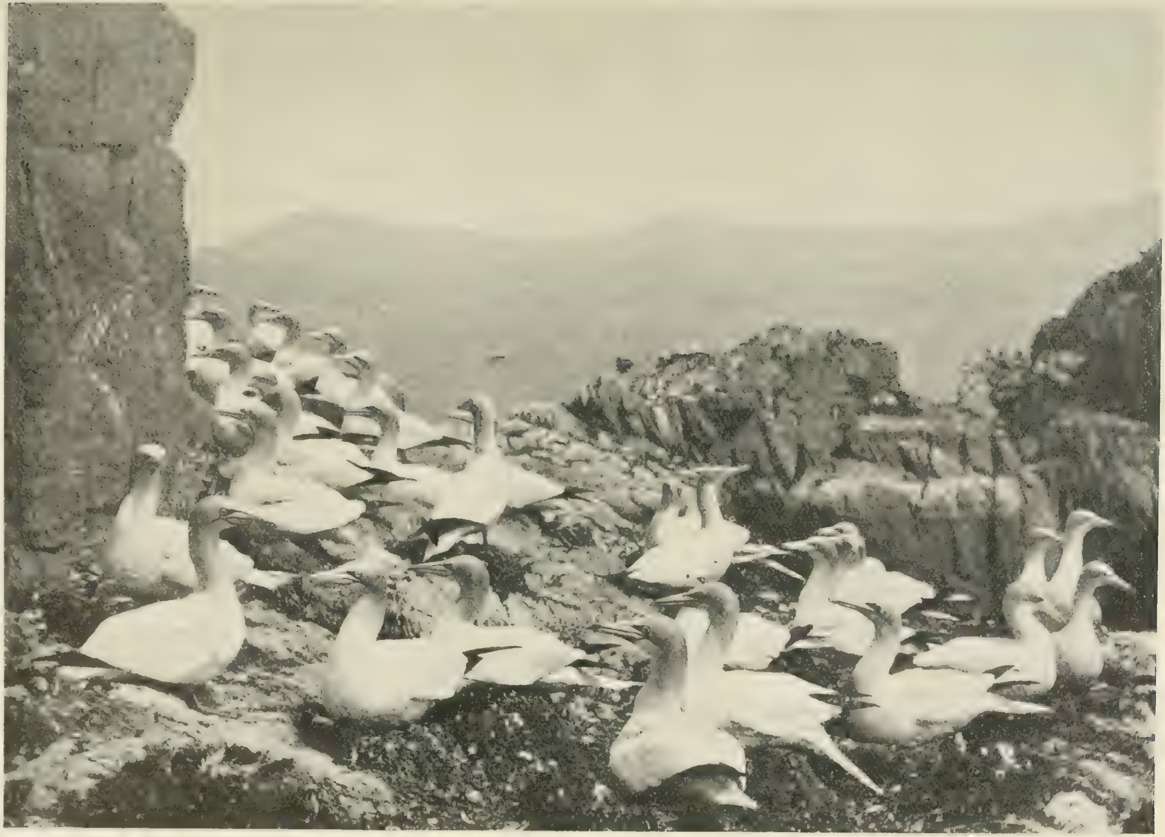
* Thompson, " Birds of Ireland," iii., p 264.

† " Zoologist," 1884, p. 477.

‡ " Fowler in Ireland," p. 261. § " Zoologist," 1884, p. 478.

‖ " Ibis," 1891, p. 9. Their breeding area was, however, still confined to the south side according to the lighthouse-keeper.

¶ " The Field," August 22nd, 1896. ** " Irish Naturalist," 1906, p. 235.



GANNETS ON THE SKELLIG.

mackerel quest. Some are still building, and they fly within a few feet of our boat, with long strings of seaweed in their beaks. Evidently our approach is resented, for many come to meet us screaming with an incessant ‘Carack! Carack!’ . . . Gannets’ nests are everywhere, and each ledge and flat is lined with them. The nest is a circular mass of grass and seaweed, from 12 inches to 15 inches in diameter, and some are as much as 18 inches in height, the gradual accumulation of years. They lay one egg only, which at first is a bluish-white, but soon becomes soiled, for the Gannet is not a cleanly bird in its domestic arrangements, although its toilet is all that could be desired. The head and neck of the adult bird are tinged with pale buff colour, body and wings spotlessly white, with the exception of the primaries, which are black; their length from beak to tip of tail about 3 feet, and with wings extended they measure 4 feet [query 6 feet?] across. Very loth were they to leave their nests, and allowed us to approach within a few feet, when they would hastily disgorge a decapitated mackerel or gurnet, sometimes two or three partially digested, but in every case the heads had been disposed of. . . .” A. D. Sapsworth (*l.c.*, 1896).

Nowhere do Gannets by choice breed far from a precipice, because their readiest way of taking flight is to let themselves fall into space, and I was told at Portmagee that to clamber up to their nests required a good deal of care, if the climber wished to avoid a blow from a descending Gannet, which might easily be very serious.

According to the lighthouse-keeper the date of the first Gannet seen on the Little Skellig in four years was found to vary from February 6th to February 28th, and that of the last Gannet seen on the same rock between September 26th and November 7th.* On the Greater Skellig there are many birds, including Storm-Petrels, but Gannets are not known to have ever bred there.

The Bull Rock.

Its Modern History.—Seventeen miles southward of the Skelligs there is another Gannetry, on the coast of Cork—Bull Rock—the history of which is, like that of Grasholm, somewhat obscure. Mr. S. N. Hutchins, of Bantry, visited this rock in 1868,† but I learn from Mr. Hutchins that this settlement was in existence before that, for about 1858 Dean Hallahan and Mr. Henry Puxley were there, and found eleven Gannets' nests. Mr. Hutchins has elicited a few facts bearing on the question from an old fisherman named Tim Harrington, namely, that, as far back as 1853 he saw Gannets on the Bull, and in 1856 found nests there, and these are the earliest authenticated. When Mr. Hutchins was at the Bull in 1868 many hundreds of Gannets were well established and nesting, and from that time onwards this settlement has flourished.

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* "Migration of Birds," by R. M. Barrington, p. 252. This book contains a great many dates of Gannets' movements taken at different seasons by the lighthouse-keepers for Mr. Barrington.

† "Zoologist," 1882, p. 110.

Although the historian Smith (1756) expressly says the Gannet bred nowhere in Munster except on the Skelligs, yet so inaccessible a place as the Bull may easily have been unknown to him, and it is unlikely that it had not been used before. Probably there has been interchange for a great number of years between the Bull and the Skellig, and the former being the smaller settlement may even sometimes have been quite deserted by Gannets. An excellent account of a visit to the Bull Rock, in June, 1884, by Messrs. Ussher and Barrington, from which I will make a short extract, will be found in the "Zoologist" for 1884 (p. 473). After assessing its then strength at 2,000, and describing the appearance of the Rock, the former continues: "On ascending the [Bull] Rock we found we could get to some of the Gannets' building ledges, both at the east and west ends, and a few of the birds remained on their nests until we approached within a pace of them. The nests were invariably of seaweed, with occasionally a little grass, not so well-built as those of Cormorants. Each usually contained one egg or young bird, but in two instances I saw nests containing two eggs each. On emptying one of these pairs I found one egg fresh, the other decidedly sat upon, so that they may have been laid by different birds. Most of the eggs, from their soiled appearance, must have been sat upon some time. The naked black young, newly-hatched, contrasted quaintly with those that had assumed the white downy covering which added greatly to their apparent

THE BULL.

growth. One nest contained a half-digested fish about the size of a mackerel. The harsh croaking cry of the Gannets was very striking. They are courageous birds: numbers of them sat while blasting took place close by, the splinters falling in showers around them. . . ."

In 1891 the strength of the Bull population was reduced to 220,* which was attributed by some to the blasting operations mentioned by Mr. Ussher, but it may have been equally due to depredations by the workmen. The fluctuations in this Gannetry are curious, and one would like to know if the numbers of the other rock birds breeding there have been similarly affected: Professor Newton, when sailing close past the Bull in 1899, did not see more than a hundred or so Gannets, but by 1902 Mr. Crowley, the lighthouse-keeper, believed their numbers had recovered to close on 2,000. It is certain that this improvement did not last, for in 1908 Crowley's successor, Mr. Hamilton, only puts the Gannets at 600, and decreasing each season.

Neither from the Skellig nor the Bull have the young Gannets ever been systematically utilised for food, and never at all that we have any record of for their grease or feathers, but a resident in the vicinity remembers a few being brought ashore for eating, and one of the fishermen told me he had seen young ones hanging up with bacon in Kerry cabins.

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* Barrington, "Migration of Birds," p. 260.

In the table to be given I think I shall be justified in ranking the Skellig Gannets at 16,000, and the present strength of the Bull at 500; indeed, as regards the former, I might probably go rather higher with safety, but throughout this book I shall endeavour not to err as some former writers have done on the side of exaggeration, the other way being the less evil of the two.

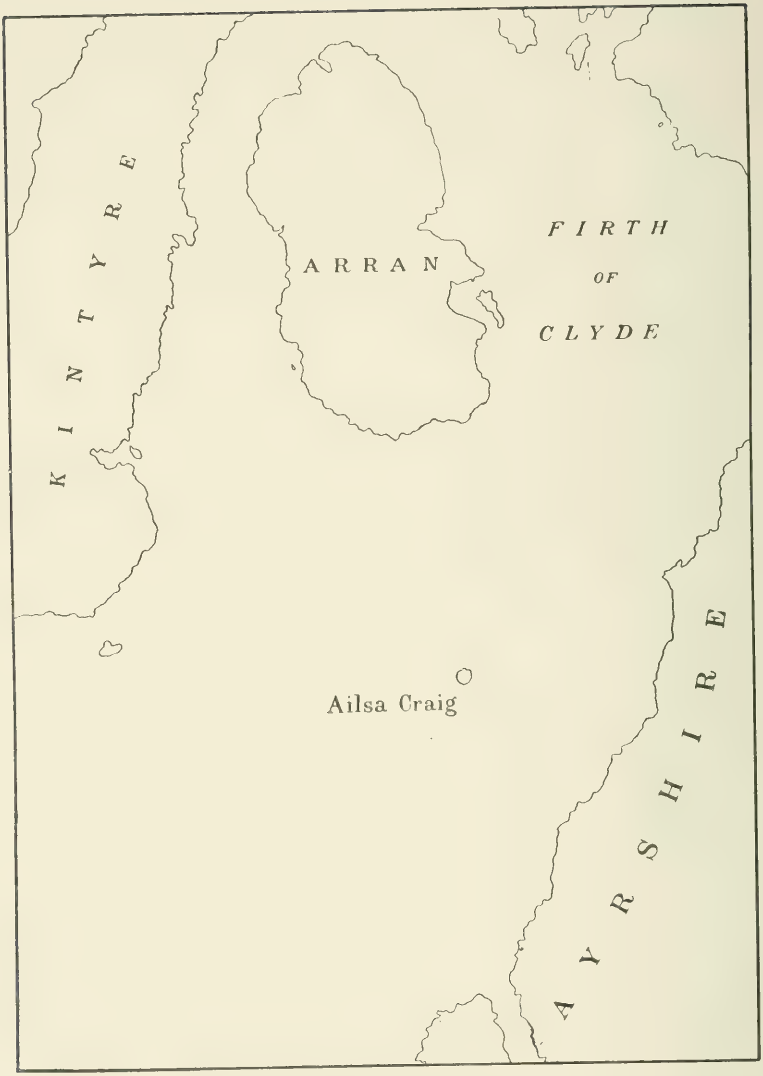
There is some reason for believing that Gannets formerly bred on "The Stags" of Broadhaven, Co. Mayo (Thompson, "Birds of Ireland," III., pp. 264, 451), but the supposition receives little credit from Messrs. Warren and Barrington (*cf.* "Zoologist," 1884, pp. 474, 479), nor does it get any confirmation from Mr. Ussher's enquiries (Ussher's "Birds of Ireland," p. 157). Yet it may be to these Stags that Smith in his "State of Kerry" (1756) refers when he says: "I have been informed that there is another rock on the north coast of Ireland where they [Gannets] alight and breed." If they ever did breed on the coast of Mayo, it is not likely that the fact will ever be established now.

CHAPTER IV.

AILSA CRAIG.

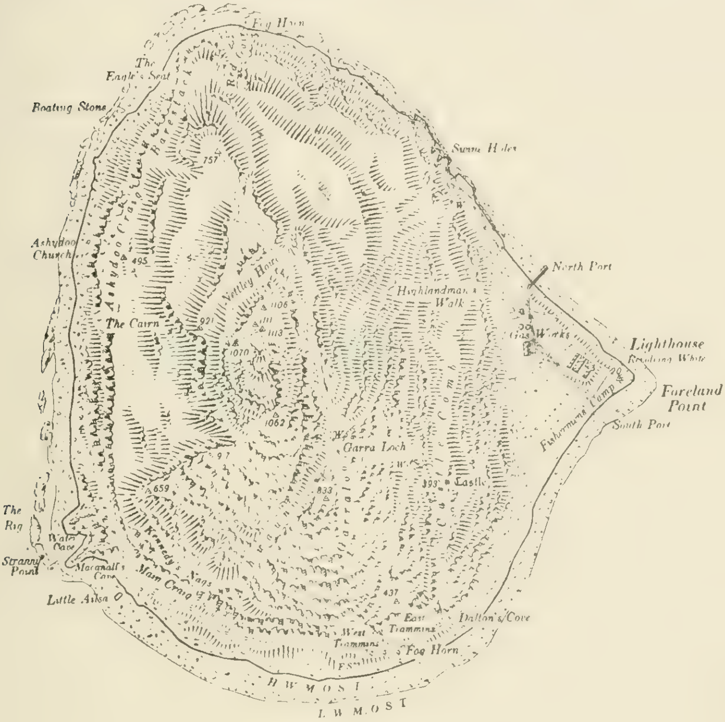
Ailsa Craig, on the coast of Ayrshire—The Early History of its Gannets—Present State of the Settlement—Remains of Dead Gannets—Number of Gannets at the present time on Ailsa.

Its Early History.—Next to the Bass Rock, the most accessible Gannets' breeding-place, and a fairly well-known one, is Ailsa Craig, the position of which, in the Firth of Clyde, is shown on the map. There will be no difficulty in finding plenty to say about the modern history of this grand Gannetry, but, unfortunately, we do not know nearly as much of its past as we should like, there being no original information extant about it before the journal of Sir William Brereton in 1635, which is to be lamented. Compared too with the better-known Bass Rock, the authorities for the annals of Ailsa are very few, and a reason for this may be found in the circumstance of Ailsa coming within notice of passing ships to a less degree than the Bass Rock, nor was it ever of any military value as a fortress, like the Bass, nor was there in its proximity any great seat of culture like Edinburgh. There exists one ancient charter which makes mention of Ailsa, and this and Fordun's


KINTYRE
ARRAN
FIRTH OF CLYDE
Ailsa Craig
AYRSHIRE

THE COAST OF AYRSHIRE.

bare notice of it are believed to be the first mention of the Craig by name; it is a charter granted by King Robert III. in 1404, confirming possession to Crosraguel Abbey.*


Fog Horn
The Eagle's Seat
Boating Stone
Swan Holes
757
Ashydoo Church
495
Ashydoo Craig
North Port
Highlandman's Walk
The Cairn
921
1106
1113
1070
Gas Works
Lighthouse
Breaking White
Foreland Point
South Port
Fisherman's Camp
1062
Garra Loch
659
833
393
Castle
The Rig
Water Cave
Stranny Point
Macanall's Cave
Little Ailsa
Kennedy's Nags
Main Craig
437
East Trammins
West Trammins
Fog Horn
Dalton's Cove
H W M O S T
L W M O S T

AILSA CRAIG.

1. The earliest reference to Ailsa Gannets is that by

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* See "Annals of the Andersonian Naturalists' Society," 1900, II., p. 136. Mr. H. B. Watt informs me that this charter has been printed by the Ayrshire and Galloway Archaeological Association in "Charters of the Abbey of Crosraguel" (1886, Vol. I.), and that the words applying to Ailsa are: "Item, insulam de Ilysay cum pertinenciis," no mention whatever being made of Solan Geese.

Hector Boethius (or Boece), in 1526, in his "Scotorum Historiæ a prima Gentis origine,"* in which there is the following (translated) passage: "Ailsay; quhair siclik plente of soland geis is, as we schew afore, in the Bass."†

2. In 1549 Donald Monro, High Dean of the Isles (*i.e.*, Hebrides) thus alludes in his "Description of the Western Isles of Scotland called Hybrides," through most of which he travelled, to Ailsa Craig, which he spells Elsay: "Elsay an iyl, ane myle lang, quherin is ane grate high hill, round and roughe, and ane heavin [haven], and als [also] aboundance of Soland geise." The "Description" is from the Dean's narrative of his travels, the first printed issue of which is stated to have been published in 1774, but there is no reason for thinking that he had been on Ailsa, or he would have told us more about it. Like Boethius he had some informant, but I am at a loss to know where he could have found a haven, of which there is now no trace, though the Lighthouse Commissioners have erected a small wooden jetty.

3. Next in order is the incidental mention by Bishop Lesly in his work "De Origine," etc.‡ (1578),§ from which

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* Vol. I., XLVI. Published at Paris in 1526, and translated ten years later—the year of the author's death—by Bellenden.

† Boece's account of the Bass will be given later.

‡ "De origine Moribus et rebus gestis Scotorum."

§ Two years after this, 1580, Sir James Balfour writes "in this Iylland there is the ruins of ane old Castell and Chapell, possest by the Earls of Cassilis," but he says nothing of Soland Geese.

a long extract will be given under Bass Rock. He merely says "Elissa, a craig in the sey foranent Galloway," where is to be found "ane foul," commonly called "ane Solande Guse." Further on, Lesly says of Ailsa that it "abundes in Solend Geis, and monie utheris Sey foulis," but when alluding to Ailsa, in his account of the Bass Rock, he says they are not so abundant as at the Bass, which is contrary to present experience.

4. In John Monipennie's "Abridgement or Summarie of the Scots Chronicles" (1597, but printed in 1603), there is the following scanty mention of Ailsa Craig, probably copied from the "godly and diligent" Donald Monro, as he terms him, though his spelling of Solan is different: "There are many conies and sea-fowles in it, specially of that kind which wee call Solayne Geese."

5. We next come to Sir William Brereton's diary of his travels—to that portion which he kept in Scotland in July, 1635.*

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* "Travels in Holland, the United Provinces, England, Scotland, and Ireland, MDCXXXIV-V.," by Sir William Brereton, Bart. Printed for the Chetham Society, 1844 (p. 117). Brereton's "Travels" which have been republished in "Early Travellers in Scotland," 1891, by Mr. Hume Brown, also form the subject of an article by Mr. J. E. Harting ("Field," August 13th, 1904), and a still more valuable one by Mr. T. Southwell ("Norwich Naturalists' Tr.," VII., p. 606). Brereton subsequently distinguished himself as a Parliamentary general, defeating Aston in 1643, and Rupert in 1644: his account of the Bass will be given in the next chapter.

"Upon the way hence [from Glasgow] to Erwin [Irvine] we discovered many islands, and, amongst the rest, the great isle of Arran. . . . One more remarkable isle, hence shows itself at forty miles distant; this is placed in the sea about sixteen miles* from shore. It is a mighty high rock, seeming very steep and high, round at the top; the name of it is Ellsey [Ailsa], and it belongs to my Lord Castle [Cassilis]; not inhabited, but with abundance of fowl, and two earies of Goose-hawks,† this year stolen by some Highlanders. This rock was in our view three days, whilst we travelled betwixt sixty and seventy mile, and, when you are at a great distance, it presents itself in shape like a sugar-loaf, and when you approach nearer it seems lower and flatter at the top, but it is to be a much-to-be-admired piece of the Lord's workmanship. In this isle of Ellsey, which is my Lord Castle's, there breed abundance of Solemne Geese, which are longer-necked and bodied than ours, and so extreme fat are the young as that when they eat them, they are placed in the middle of the room, so as all may have access about it; their arms stripped up and linen cloaths placed before their cloaths, to secure them from being defiled from the fat thereof, which doth besprinkle and besmear all that come near unto it."

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* Only nine miles.

† No doubt eyries of the Peregrine Falcons, but only one pair breeds there now.

This description of a Gannet feast does not sound very appetising, but the story makes one wish that Brereton had landed upon the Craig, to which, as Professor Newton judges from the journal, he would have been opposite on the mainland about the first week in July. I have not elsewhere met with the name Solan spelt "Solemne," and this peculiar spelling may possibly be a copyist's error.

6. Mr. John Paterson, to whom I am indebted for much other information, has furnished a reference to William Abercrummie's "Description of Carrick [the southern district of Ayrshire] in 1696."* Here the reader is apprised of there being on Ailsa Craig "Store of Solan Geese in so great plenty, that the very poorest of the people eat of them in their season at easie rates : besides other sea-fowles, which are brought from Ailsa, of the bigness of ducks, and of the taste of Solan Geese, and are called *Albanacks*, or *Ailsa Cocks*, and *Tarnathans*, of which there is so great a multitude about that Isle, that when, by the shot of a piece, they are put upon the wing, they will darken the heavens above the spectators. This Ailsa is

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* "Historic Ayrshire," 1891, edited by William Robertson, Vol. I., p. 86.

a rock in the sea, in which those Solan Geese nestle and breed; in which also there be conies and wild Doves." "Albanacks" were Puffins, but there is no such name as "Tarnathan" known now, nor is it in the Gaelic dictionary. The editor of "The Annals of Scottish Natural History" plausibly suggests that "Tarnathans" were Guillemots.

7. Some of the historians of the eighteenth century, as, for example, Sir Robert Sibbald (1710), J. Steyer (1718), and Daniel Defoe (1722), allude to the Gannets on Ailsa Craig, but have no first-hand information to offer about them, apparently merely copying from previous writers.

8. The visit of Thomas Pennant, the author of "The British Zoology," to Ailsa in 1772, some four years after that book was written, perhaps hardly comes under the denomination of early history. His ship lay two nights by the Craig, of which he gives two pictures in his "Tour in Scotland" (II., p. 215), but he tells us little about the birds; at that time the Craig was the property of the Earl of Cassils,* who received £33 a year rent for it, which the tenant must have partly paid out of the profits of his

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* Cassils, or Cassilis, one of the titles of the present Marquis of Ailsa, before the creation of the marquisate.

birds. If Pennant's visit had been before instead of after the publication of "The British Zoology," we could not have failed to have had some account of the birds seen by him on this famous breeding station of sea-fowl.

The Present Condition of Ailsa Craig Gannetry.—Lying some nine miles off the coast of Ayrshire, this mighty Craig, formed of columnar syenite, rears its great head heavenwards—1,114 feet high by Ordnance Survey—and certainly covers twice the area of the Bass Rock, if not more, and I think there are more Gannets on it. The most striking feature is its basaltic or rather syenitic columns, stated to be four, five, and six-sided, resembling, says the Rev. R. Lawson (who has written a useful guide book), the columns of Staffa, or Giant's Causeway, although not so perfectly formed. "From the base to the summit, every here and there, the tops of these columns have been broken off; and it is on the flat surface of these broken columns that the birds [Gannets] nestle."*

Any inequality is also taken advantage of, several Gannets sometimes making use of the top of a single column, and not always with the appearance of security, so that Mr. Lawson thought it wonderful that some stormy night the nests were not all swept into the sea, but the seaweed of which they are built is not without adhesive properties. Here birds of such conservative habits as Gannets must have nested from time immemorial, and although at one period, owing to persecution, their numbers diminished, they gradually recovered after the passing of The Sea Birds Act in 1869, which protected Gannets everywhere except at St. Kilda. In those days the late Mr. Robert Gray, then of Glasgow, was one who befriended these Gannets with his pen in the "Times." Now they are still increasing and have no need of a champion. This, at any rate, is the opinion of Mr. W. Girvan, who has long been tenant* or tacksman of the Craig under the Marquis of Ailsa, and no one is better qualified to offer an opinion. Certainly their breeding ground now covers fully three-quarters of a mile of cliff, but there is still plenty available for further spreading. No Gannets nest on the grass slopes, of which the upper portion of the Craig is composed, nor have they ever done so as far as Mr. Alexander Thomson, the principal keeper of the lighthouse, is aware. This is rather remarkable, because we know that the grass slopes of the Bass Rock used to be largely occupied ; but here also the presence of visitors may have driven them away.

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* "Ailsa Craig: its History and Natural History," by the Rev. R. Lawson, Paisley, 1895.

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* Two brothers, William and Andrew Girvan, are, Mr. Harvie-Brown informs me, jointly tenants of the Craig.

There are few who will forget a first visit to Ailsa Craig: mine was with a friend, no longer living, more than forty years ago, when the young Gannets were still gathered every summer, but this practice has ceased now. The method of despatching them was evidently the same as at the Bass, for I remember our rowing down a fine young bird which was recovering from a terrible blow on the back of its neck, no doubt inflicted by the fowlers, who generally killed them with a billhook or cudgel, and pitched them into the sea. That this bird should have lived after such treatment, and been in good condition, too, with a wound the size of an orange, proves what Dr. R. O. Cunningham has noticed, viz., the facility with which they recover from accidents, and the rapidity with which re-ossification of their broken bones takes place.*

Young Gannets were thought fairly good for the table at Girvan at that time, but it is not likely they were ever esteemed of the same value as at the Bass. Ailsa Gannets were only sold for consumption among the lower classes, together with Puffins and Guillemots, and were eaten by those who could not afford mutton and beef. I have since learnt that the prices which they realised were ridiculously small, and since about 1880 there has been absolutely no demand for them for eating, consequently the harvest of the Craig has been discontinued for many years, greatly to the benefit of all the birds, though not altogether to the satisfaction of the lessee, who paid to the Marquis of Ailsa a rent of £30. Although Puffins were taken in great numbers, and also Guillemots, from what I can glean the harvest of young Gannets never exceeded 400 or 500, which is less than one-third of what used to be gathered at the Bass. But Gannets' eggs, which were not in request at the Bass, were liked here, and the more accessible of them are still collected and eaten with relish. Gray and Anderson give a few interesting particulars of this Ailsa industry.* According to their figures the number of sea-birds taken weekly on Ailsa Craig, by means of cliff nets, used to average 150 dozen in the season, chiefly Puffins and Guillemots, with some Gannets. If this went on for ten weeks, the number would have mounted up to 18,000, and probably all of them breeding birds, which could not fail to have its effect. These we learn from another writer, were brought over by the boat-load and hawked up and down the towns and villages on the mainland, where, says Mr. J. Macrae (" Land and Water," August 12th, 1871), the old Girvan bellman could be heard crying them, first giving three rings of the bell, and then calling out aloud: " Ailsa cocks, cleaned, and ready for the pot, 2d. each. Peaties and Strainies, 1d. each, cleaned." The " cocks " I learn from Mr. Thomson were Guillemots, and the " Peaties " and " Strainies " Puffins and Razorbills.*

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* A young one, macerated by Dr. Cunningham, which had by some means fractured furculum, pelvis, and sternum, in fact every bone in its body, had already in a few months got all these injuries repaired by ossification and the natural effusion of callus.

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* " Birds of Ayrshire and Wigtownshire," 1869, p. 62, and " Birds of the West of Scotland," p. 436.

In 1905 I was at the Craig again, this time accompanied by Mr. A. Parker and Mr. Henry Gurney, when we spent four busy summer days on the island, sleeping at the lighthouse and watching the birds, having ideal weather for exploring the rock from June 27th to the 30th. What made this second visit the more interesting was that it was at a date almost identical with the visit of Thomas Pennant, the author of " The British Zoology," who, however, has disappointingly little to tell us (" Tour in Scotland," II., p. 215) about the Gannets or any other birds. Both Mr. Parker and Mr. Gurney had brought cameras with them, and took photographs of the Craig for me, but I think a view by Mr. Charles Kirk, of Glasgow, gives, on the whole, the best idea of its grim aspect. On the left of the photograph are the west cliffs, where the Gannets breed in what looks like inaccessible security, while on the right can be seen the old tower which Pennant found such difficulty in climbing up to. As we reached this square tower a fine old Raven, disturbed in his repast, rose from the ground, leaving a half-eaten rat behind him. A few pairs of these birds breed in the cliffs every year—long may they continue to do so, and keep the rats, of which there are too many, in check. We afterwards saw five Ravens on the wing together.

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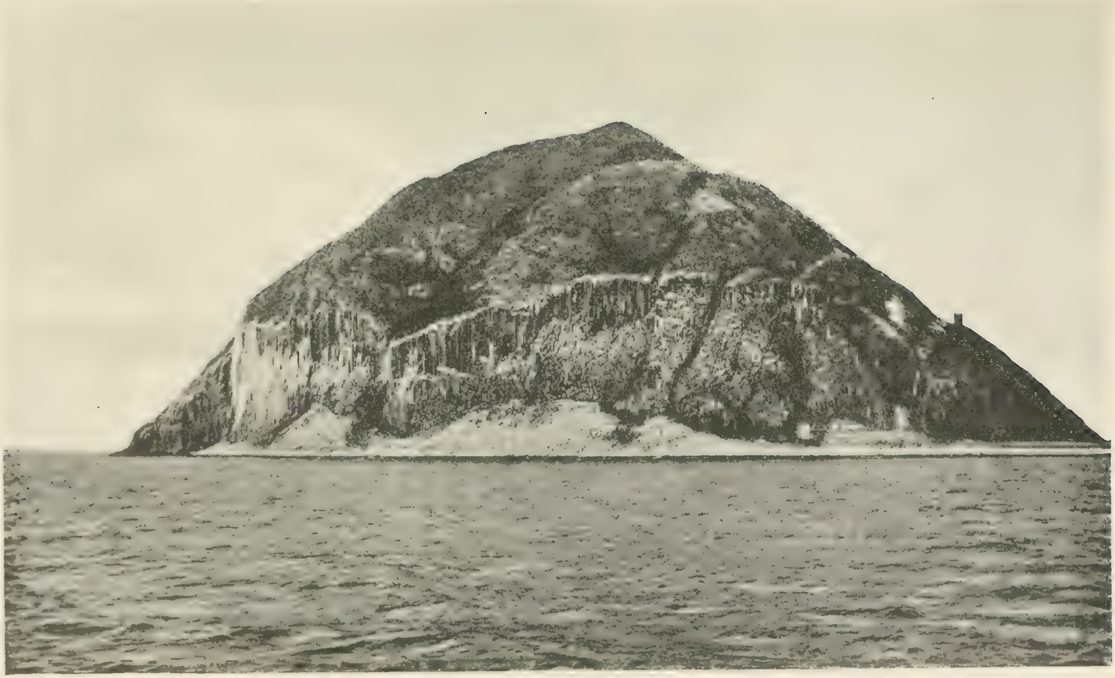
* There was also a trade in feathers, and Mr. Paterson tells me there is a letter of Robert Burns, the poet, which proves that the feathers, of which he asks a friend for a few stone, had a market value as far back as 1788. But these also were extremely cheap, never rising above 16s. a stone, although at the Bass they made a little more. They told us on the Craig that the feathers of about 384 Puffins went to a stone, and that it took three stone of feathers to make a bed—that means the lives of 1,152 Puffins! According to the late Mr. E. T. Booth the feathers of nearly 100 Gannets are required to weigh a stone, so each Gannet produces almost as many feathers as four Puffins. In St. Kilda 80 young Gannets go to a barrel (Mackenzie).

Mr. Thomson, who acted as our guide, informed us that the arrival and departure of the Gannets were much the same as at the Bass—that is, they come at the end of February, and nearly all quit the Craig in October, being of all the fowl the first to come and the last to go ; and for this a sufficient reason may be found in the fact of their requiring a longer period for the incubation of their eggs, as well as for the nurture and up-bringing of their young.

It is only on the most precipitous cliffs, which Mr. Lawson says are known as the Main or Goose Craigs, and which face westwards, that the Gannets are found, and here their breeding area extends, though not without interruptions, for fully three-quarters of a mile, from what is marked on



AILSA CRAIG FROM THE SOUTH.

the map as Eagle's Nest to the south fog-horn, the blasts from which they do not mind. Indeed, there were Gannets everywhere,* and Mr. Thomson subsequently considered it to have been the best hatch for many years. Although Gannets' nests had not been altogether unfamiliar objects either to me or my brother-in-law, one reason of our visit was, of course, to see them again, but though in plenty, they

MAIN CRAIGS, AILSA.

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* Mr. Kirk says he has generally found second year Gannets in the piebald plumage in groups apart from the adults, as if not breeding; the percentage of these second year birds did not seem to us quite so high as at the Bass, being about one in forty, and we did not notice any separation, such as Mr. Kirk alludes to. Mr. Bentley Beetham has also many times seen groups of immature Gannets resting on the top of the cliffs apart.

are not very accessible at Ailsa, and it requires nerve to clamber down to them.* As at the Bass Rock the nests are chiefly composed of seaweed, and great untidy heaps some of them are, while others are so trodden down that they hardly deserve the name of nests. As long ago as the fourteenth century the size of these substantial structures attracted attention, but as a matter of fact some are not more than eighteen inches in diameter. Besides the seaweed a great deal of the Red Campion and Bladder-Campion which grow upon Ailsa, is made use of, and I believe also stalks of the bracken, but they have their choice of materials for the flora of the Craig is luxuriant to the extent of rankness. "Nowhere," says Mr. Lawson, "will you see such beds of Wild Hyacinth, Red Campion, Bladder-Campion, and Scurvy-Grass."† The Tree-Mallow is also found, and several kinds of fern, and many other plants known to botanists.

As I expected, very few young Gannets were hatched by June 27th—the date of our visit—for which we were sorry. One youngster, about as large as a Turtle-Dove, and just below me, was donning its jacket of white down, while another, about two days' old, was of a dark grey tint,

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* Afterwards at the Bass Rock I found indiarubber-soled shoes very useful for rock climbing.

† Lawson's "Ailsa Craig," p. 60.

GANNETS ON AILSA CRAIG.

with a nearly bald head. When hatched they are nearly black, and practically naked, resembling, as has been aptly said, a toad more than a bird. Doubtless there were a few more young ones further down the precipice, had I had the pluck to descend, for Mr. T. C. Walker, who visited the same cliffs on the 20th of June, 1866, found several hatched. After describing the Rock, and the features which most struck him, he says: "In a few nests further down I observe several newly-hatched Gannets, totally black, with a downy powder like the germs of feathers. In several eggs the young are squeaking through the holes . . . . I break the shell and liberate several astonished youngsters, much to the discomfiture of the old birds, who hover round, cackling most ferociously. The young, when just hatched, have a curious look, little black imps with a big head, fat body, and tiny* webbed feet sprawling about the nest. They are perfectly bald, about four inches long, and very lively."† Very slow is the growth of the young, but their down soon comes. For a time the old bird keeps them warm with her body, but when the nestlings get too big for that, she places herself beside them, as shown in Mr. Kirk's photograph. At the Bass I have seen old Gannets sitting beside offspring, which were so big that they almost equalled their parents in size. The period of juvenescence lasts a very long time compared with that of most species, from the laying of the egg to the flight of the young one being not less than fourteen weeks I feel sure.

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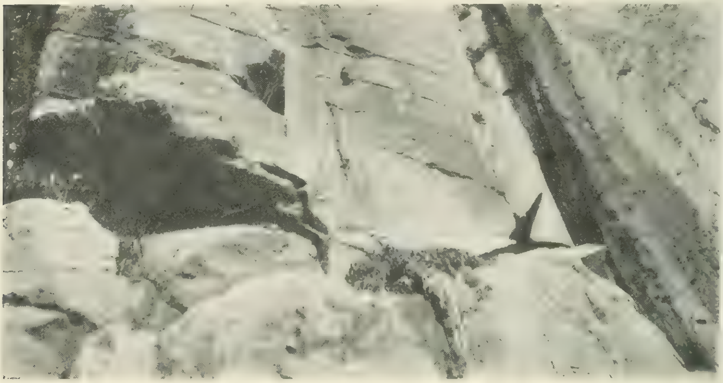
* At seven days Mr. Kirk finds the web measures $1\frac{1}{2} \times 1\frac{1}{4}$ inch.

† "Zoologist," 1868, p. 1366.

The young take to the sea in September, and from that time onwards, until they learn to fish for themselves, subsist on their own subcutaneous fat, the layers of which surround them like a jacket. How long this period of indolence lasts is unknown, but possibly several weeks elapse before they begin to fly; it is true that early young ones may be seen already plunging for fish in the latter part of September, but these must be Gannets three months old at least. If there is a gale from the west or south during this month, Mr. Thomson tells me, numbers of young Gannets are to



A GANNET ON ITS NEST.

be seen, which have been blown round to the east side of the Craig, having been in some cases carried high over its grass slopes and dropped somewhere on the thirty acres of level ground by the lighthouse.

I now settle myself in a safe position to watch the Gannets at leisure, with a guardian at hand in Mr. Thomson to catch hold of in case of giddiness. Some of them are clearly returning from distant fishing, or seaweed hunting; others are going out to sea with a settled purpose for something; others again are seeking apparently for their rightful nests, which they may well have a difficulty in recognising among so many; while still others are merely playing with the wind, wafted hither and thither as its slightest movement takes them. Backwards and forwards the Gannets circle; to attempt to follow their mazy flight with eye or pencil is a futile task, but it is a never-to-be-forgotten scene, one which Mr. Walker well describes, and which impressed itself much on both me and my companions. Probably Gannets are often on the wing in winter time for forty or fifty hours at a stretch, without alighting to rest on the water, but less in the summer. As they pass and re-pass we have an opportunity of remarking that the toes are close folded, but the legs stretched out evidently to the full, though sometimes quite hidden in the plumage. It was easy to see this when now and then one soared quite close overhead, but let there come a breath of wind, or a turning on the cliff, and instantly the feet drop into view, and their value for steerage, in conjunction with the rudder-like tail, becomes apparent.

Carrying seaweed about is a favourite occupation, and although some may be taking it to their nests, others are flying about in an aimless way with the polished fronds of the common "Tangle" * dangling from their beaks. I am assured that they continually patch up their nests, and even go on adding seaweed to them down to the time when the young are ready to leave; but that they make a circle of the seaweed and lay the egg on the bare rock in the middle, as some have thought, is not borne out by observation, nor can I for a moment credit the idea that the Gannet's white secretions assist in binding the seaweed to the rock. The celebrated Harvey, the discoverer of the circulation of the blood, entertained a similar idea about the egg, which he had been told was bedewed, when laid, with a thick and viscid moisture, which set speedily, and thus the egg became soldered as it were, or agglutinated to the subjacent rock. That some of the nests are two or three years old is likely enough, but in that case they

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* *Laminaria digitata* and *Fucus vesiculosus.* The late Professor J. H. Balfour identified 23 species of seaweed on Ailsa Craig ("Phytologist," 1845).

WEST CLIFF, AILSA.

WEST CLIFF.

are repaired each summer, or the fabric would not hold together.*

Looking down from above, one would say that this Gannet settlement was a fairly silent one, when it is quite at rest and there is no disturbing element, such as the presence of a climber on the ledges, at the same time there is certainly more noise to be heard when one stands on the shore below the Gannets, but even then it is principally the cries of the Kittiwake which fall on the ear. Row out a quarter of a mile, and, on a calm day, the hum of the busy hive sounds far and clear over the water, nevertheless a Gannet undisturbed is not the noisy bird which it has been represented to be, however much it cackles when alarmed.

Before leaving home I had made a mental note to observe which way the Gannets and Guillemots, and other birds, sat or stood on their ledges when undisturbed, and whether they changed position according to the wind, which seemed likely, because there is generally method in birds' actions, and a reason for everything, even though we cannot discern it. The result was that we found most of the Gannets when sitting on their ledges faced the cliffs, turning their backs to the sea, as we noticed did many of the Guillemots, and it proved to be just the same at the Bass Rock afterwards. This position may be assumed in part to save their long tails from abrasion. If there is any current of wind they would naturally by preference turn towards it to keep their plumage smooth, but failing that, they face the cliff.

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* At St. Kilda the late Rev. Neil Mackenzie says the nests are renewed from time to time as hatching goes on, and these materials decaying annually, form a small mound which gets yearly larger ("Annals Scottish N.H.," 1905, p. 144).

Fish eaten by Gannets.—Many of the Gannets were evidently at sea, fishing for themselves or their sitting mates, and Mr. Thomson and I could see them coming in from a distance ; a very long way off their white forms may be viewed as in parties of four or five they wing their straight course homewards, each of them probably bearing a gullet full of fish. The extensive Ballantrae herring bank, which is so near at hand, covering fifteen miles or more, must be a very convenient fishing ground for these Ailsa Gannets, and it is not to be wondered at that their proceedings at times excite some jealousy among the local fishermen. Many a pound of fish is daily brought to the Craig, fresh from the salt waters of the Firth of Clyde, as nutriment for their mates and young. If it is for themselves the fish takes a little time to digest, and for a period the old birds are to be seen, satiated with their repast, quietly dozing on their ledges until it is time to be hungry again and seek another meal. One old Gannet, which I suspect had not long returned to its ledge, was so alarmed, on suddenly seeing my head between herself and the sky, that she disgorged her dinner, consisting of two fresh undigested herrings.* The usual food of Ailsa Gannets, according to the testimony of those on the spot, consists of herrings, mackerel, sand-eels, and gurnards, all of which Mr. Thomson has at different times seen in their nests, and to this list the tenant of the Craig, Mr. Girvan, adds the garfish. In a later chapter a list will be given of all the fish on which Gannets have been known to feed, but herrings and mackerel are their customary food. These, with cod, haddocks, whitings, pollack and coal-fish (saithe), are abundant at no great distance. Gurnards are a source of danger to them, and in the previous year Mr. Girvan saw a Gannet which had been choked by one.

It is worthy of note that the vicinity of Ailsa has long had a reputation for the quality and abundance of its fish. Donald Monro speaks of the "very good killing [of] ling and uther whyte fishes," and Pennant of "the capture of cod, which abound from January to April on the great bank" near. It is singular that so many fish should be found near the Craig, considering the presence of the birds, and the fact may be cited as an argument in favour of their preservation.† In 1877, eight years after the passing of the

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* Herring-Gulls are not above flying off with fish which a Gannet disgorges, on the contrary it is a booty they are on the look out for.

† There are swarms of fish round St. Kilda, which is another favourite fishing ground for trawlers (*see* "St. Kilda," by N. Heathcote, p. 207), where Gannets breed by thousands.

Act to protect sea-birds, John Melville, fishery officer at Girvan, even reported an increase in the number of herrings (" Report on The Herring Fisheries," p. 146), which did not look as if the birds consumed too many. The fecundity of sea-fish is something altogether incredible, and the more they are preyed upon the more they seem to multiply! At the Bass Rock there is an idea that the fish are attracted by the droppings of the birds, which seems quite possible.

On one ledge of rock, running into the sea, on the west side of the Craig, called, I believe, Stranny Point, from which a small regiment of Gannets flew away on the boat's approach, lay two or three parcels of regurgitated fish, which had been ejected by the birds on being disturbed by our approach. It was not until I had landed, at some risk of a good wetting, that they were noticed, and at once carefully examined, when it was found that these ejected pellets consisted entirely of small fry. These pellets were of considerable size, and in one alone there were about fifty-eight little fish, which, from their condition, it was evident had not long been swallowed. The Gannets may have been swimming when they met and regaled themselves with a " ball " of pollack or coal-fish fry, little fish averaging less than two inches, as it seems improbable that they should have got them by plunging.

Remains of Dead Gannets.—At low tide it is comparatively easy to walk round the Craig by dint of scrambling over large and small syenite boulders, among which it is sad to see the rotting carcases of defunct sea-birds, chiefly Gannets, from whatever cause they lie there. I counted the withered remains of seventy-three dead Gannets below the west Craigs, where the largest number breed, among which were a few second-year birds, but no young ones of the first year. Some of these unfortunates may have died a natural death, or been injured by falls when fighting, but Mr. Thomson says a good many are wantonly shot from yachts in summer, and some of them float ashore on the Craig, or, if wounded, have perhaps strength to reach a ledge and die there. Indeed, both here and at the Bass Rock I could see dead Gannets on the ledges with my glasses. It seems very regrettable that those who are at sea, whether they be yachtsmen or fishermen, should fire so much at these birds, which is often done for heedless sport, and not because a specimen is wanted for stuffing. The law, it must be remembered, is infringed, and perhaps several Gannets may be wounded for the chance of getting one, and when they are killed, Mr. Thomson says they are not always gathered, showing how little the so-called sportsman cares about them. Mr. C. W. Devis states how in March, 1865, the market at Manchester was inundated with dead Gannets* for three weeks, which had all probably been killed at Ailsa Craig, either in the thoughtlessness of so-called sport or with the mistaken intention of benefiting the fishermen. At one spot beneath the cliff sixteen Gannets were lying together among the stones, how killed it was impossible to say. Many of them gave me the impression of having been dead several months, but here and there was one comparatively fresh. They were lying high and dry on a part of the undercliff, not ordinarily reached by the tide, which may have swept others away; if so, the mortality was all the larger. The Gannet is very liable to accidents, and it is not unlikely that some of them get carried against the cliffs in a gale, or during a fog, and strike the hard rock with so much violence as to be killed or injured. This is an accident which sometimes befalls the Manx Shearwater.†

The Gannet is a bird which in some ways is a marvel of intelligence; in other ways it is very much the reverse. For example, it will precipitate itself on a dead herring nailed to a board, and there are several anecdotes which I believe to be true of these over-eager birds killing themselves by plunging into boats attracted by the glitter of fresh caught fish in them. As an instance of what seems to us sheer stupidity, Mr. Thomson mentioned his having seen one dash itself against the walls of the lighthouse yard, on a clear, calm day, when there was absolutely nothing to account for such mad behaviour, unless it was suffering from any irritation caused by parasitical *Mallophaga*, with which they are infested.*

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* "Zoologist," 1865, p. 9597.

† I have found five-and-twenty Shearwaters in a walk in the Scilly Islands, most of them showing marks of a violent blow, and all dead. Storm Petrels are also known to dash themselves against the rocks occasionally when borne away by the wind (*cf.* Ussher "Birds of Ireland," p. 385).

We found one unlucky Solan with a broken wing at the foot of the Craig, and two which were either sick or very sleepy, and these my friends captured, but not without difficulty, for they at once made for the water, albeit awkwardly, and we had already discovered that on that element a Gannet swimming is more than a match for a boat. One of these was sent by Mr. Parker to the Zoological Gardens, but not being supplied with enough fish it did not live very long.

Gannets Enmeshed in Fishing Nets.—Besides perils from yachtsmen, Gannets have something else to contend with in the Firth of Clyde, for they are not infrequently enmeshed and drowned in fishermens' nets, a fate which is caused by their voracity, and to which Mr. Lawson alludes in "Ailsa Craig."* Captain Digby, whose gunboat was appointed in January, 1877, to attend the winter fishery at Ballantrae herring bank, which extends from opposite Ailsa Craig to Loch Ryan, tells me that on one occasion he found quantities of small pieces of nets floating with dead herrings and Solan Geese entangled in them.† These nets had been, he ascertained, anchored the week before, where there was a depth of sixty feet of water, but the weather had been so bad that the swell shifted them, and they came to the surface. Whether the Gannets had got entangled in them when submerged at that depth, or whether it was from plunging on the herrings after the nets floated, was not certain. The harbour master at Girvan assures me that it is no uncommon matter for the fishermen to find Gannets which have dived as far down as their herring nets, and even to get them enmeshed in cod nets, when set at a depth of ninety feet, but to their great powers of diving I will allude again in Chapter X., and a very remarkable story of an incident which happened at Ballantrae, about fifteen miles from Ailsa, where a great number of drowned Gannets rose to the surface enmeshed in a 5-inch cod net will also be narrated in the same chapter.

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* A case of one deliberately killing itself against the balcony of a lighthouse is given by Mr. Barrington ("Migration of Birds," p. 252). No Gannet has been known to fly against the lantern of the lighthouse at Ailsa or at the Bass.

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* *l.c.*, p. 46.

† See "Rep. Herring Fish., Scotland," 1878, p. 101.

Number of Gannets on Ailsa.—It was June when we were at Ailsa, and on two days of our sojourn the sea was as calm as glass, and every swimming Guillemot and Puffin could be seen as in a mirror. With our minds full of the idea of taking a census of the birds, the notion forcibly suggested itself that in such ideal weather it would be possible to take a series of large photographs of the entire Gannet cliff area from the sea, on a scale which would admit of counting the Gannets with a magnifying glass afterwards. It would be necessary to divide the cliffs into six or eight sections, which perhaps it would be found practicable to indicate by large daubs of red and white paint at their base. I mentioned the plan to a very successful photographic artist, Mr. Charles Kirk, of Glasgow, and I believe he considers it a feasible plan, and may possibly some day find an opportunity to undertake it. Mr. Kirk had already taken some excellent, and very large, views, but these are from the land, and not divided into sections. One of the best of them, taken from a projecting part of the cliff, includes a large stretch of the breeding ground, for it shows under a magnifying glass about 855 white specks, which have been counted, and the greater part of which are undoubtedly Gannets. I think Mr. Kirk would agree that this photograph takes in as much as a sixth part of the whole breeding area. From this we can draw a conclusion.

for if we compute that 750 of the 855 specks on the photograph are Gannets, and reckon that nearly half of them—say 350—had mates away at sea fishing, we at once arrive at 1,100 Gannets as belonging to the area comprised in the photograph. Multiply 1,100 by six similar areas, and we get a total of 6,600 Gannets as comprising the whole community.

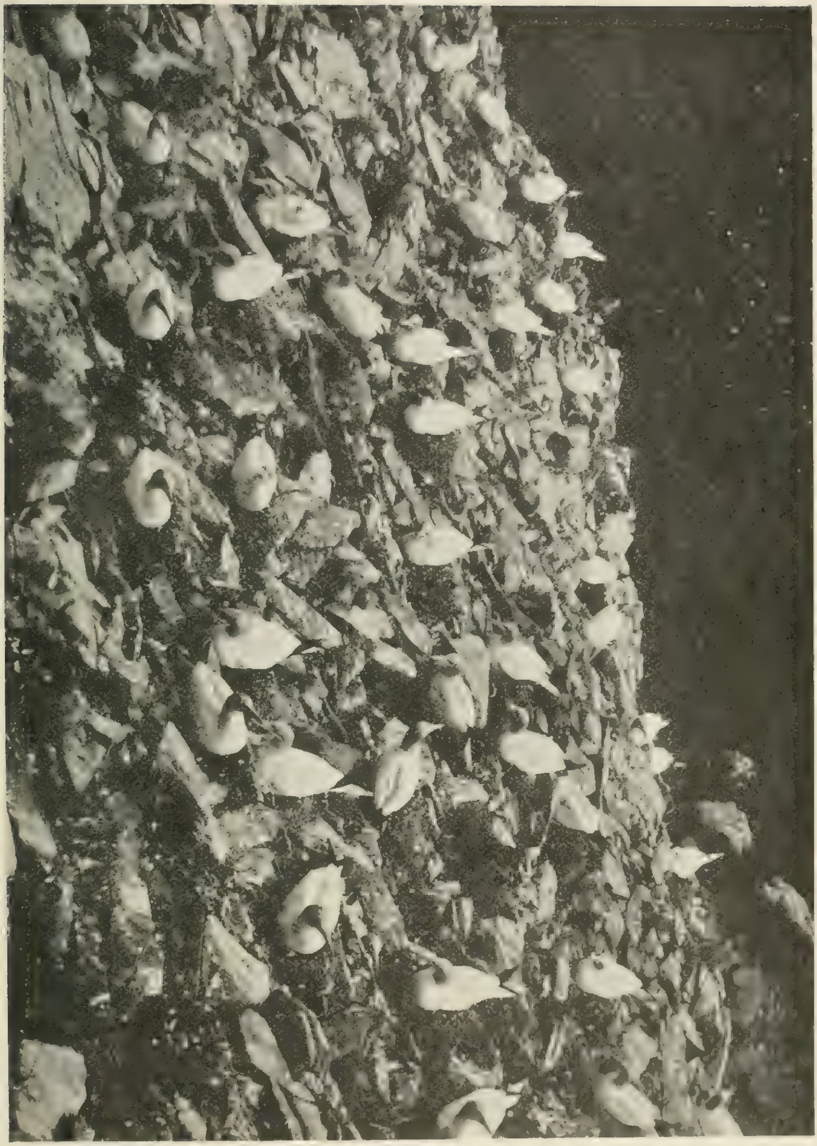
Another method of estimating the Ailsa Gannets has been furnished by Mr. Thomson. He remembered well that, very shortly before our visit, which was in June, two young men, the sons of the lessee, had, by skilful climbing and the use of a rope, gathered 360 Gannets' eggs from one ledge, or tier of ledges, which extended a good way. My companions and I saw this ledge from the land, and also contemplated it from the sea, and we considered that the Gannets were slightly thicker there than at any other spot on the cliffs. If we allow the occupants of this ledge to have numbered 850, for although a less number would suffice to have produced 360 eggs some might be non-breeders, and say that the Gannets on it comprised a seventh part of the Ailsa community, the entire number would stand at 5,950.

There is still a third way of estimating a Gannet settlement, which is by comparison. Take the largest Goose farm in England, where the number of Geese kept in a domesticated state is registered, and compare that known number, or, rather, the space occupied with them, with the unknown Gannets on Ailsa Craig. It appears on inquiry that the largest Goose farm is Mr. Harrison's, at Halsall, in Lancashire, where there are 8,000 Geese. Mr. Harrison has obliged me with a photograph of his birds, and I should say there were nearly as many Gannets seen by us at Ailsa as he has Geese. It is, however, very difficult to form a correct notion from a photograph, but if anyone who had recently inspected the Gannets at Ailsa or the Bass found a favourable opportunity of seeing one of the large Goose farms, he could probably form a fairly just comparison between them and the Gannets. Perhaps this mode will not be thought a very good way of dealing with the numbers of birds, but still it is a plan which need not be set aside.

To be on the safe side I do not propose to reckon Ailsa as having more than 6,500 Gannets. Neither Mr. H. Gurney nor I thought it a much larger Gannetry than that of the Bass Rock, which, judging from the numbers of young ones formerly taken, we rate at 6,000 only. I am well aware that 6,500 is a figure much below some of the estimates which have been formed of Ailsa Gannets; for example, one who knows Ailsa well, suggests as high a population of Gannets as 30,000, but then these figures are hypothetical and have no basis to go on, and can only be accepted as the guess of an observant man. This great hive of Gannets has never thrown off any colonies that we know of, but on May 25th, 1883, Mr. R. Service found two Gannets' nests on the Big Scaur, one of them containing a broken egg, and he saw the pair of old birds flying close at hand. The Big Scaur is a precipitous rock on the south of Wigtownshire, lying between the Mull of Galloway and Burrow Head, and would be by sea about fifty miles from Ailsa Craig, from where presumably these Gannets came.

We made no attempt to assess the numbers of the other birds on the Craig, but Mr. Kirk is of opinion that there are quite five times as many Puffins at Ailsa as there are Gannets, and nearly as many Guillemots, but Mr. Thomson thinks the Puffins are decreasing in numbers, owing to rats. Anyhow there are plenty, and the noise caused by the "whish" of Puffins shooting through the air, as they descend from the upper parts of the Craig with the velocity of a Falcon, is quite alarming to anyone who does not know whence the weird sound originates, often continuing as it does far into the night. We heard several of these Puffins' descents as late as 10.30 p.m., but the Gannets, Mr. Thomson says, are not on the wing at that time of night.

The whole Craig is a marvel of life, and, given fine weather,



AILSA GANNETS SEEN FROM ABOVE.

one of the most enjoyable spots in the world. In a poem by the Rev. J. T. Levens we read:—

“The feathered fishers of the deep
  Have chosen Ailsa for their home,
And in their thousands fleck its steep
  And naked crags, like flakes of foam.”

Wordsworth and John Keats have also sung its praises.

CHAPTER V.

ST. KILDA, SULISGEIR AND THE STACK.

The St. Kilda Islands—Borrera, Stack Lii, Stack an Armine—Early History of these three Settlements—Martin's Estimate of the Gannets—Dr. Wiglesworth's Estimate—Sulisgeir—The number of Gannets there—The Stack of Suliskerry.

St. Kilda.

The Early History of its Gannets.—Of all the Gannet settlements that at St. Kilda is the most important, as it is the most central.* Here every year a vast number of these singular birds nest, and rear their young on three lofty island stacks, which are all in close proximity to one another, and forming part of the St. Kilda group. Our first knowledge of the island of St. Kilda is comprised in two brief mentions of it to be found in Fordun's celebrated "Scotichronicon," of which the first passage tells almost nothing, but the second—penned, perhaps, between 1360 and 1388—while making no mention of birds, draws attention to the half-wild sheep which had been at some earlier period introduced on to this island, then called Hirth.* Neither does Hector Boethius (1527),† to whom we owe the first notice of Gannets at Ailsa, mention birds at St. Kilda, but he alludes to the sheep. He says : "This last Ile is namit Hirtha, quhilk in Irsche, is callit ane scheip [sheep] ; for in this Ile is gret nowmer of scheip, ilk ane gretar than ony buk," which, in respect of the size of their horns, was afterwards noticed by Martin. Bishop Lesley (1578) and John Monipennie (1603) take a certain amount of notice of St. Kilda, but they again do not allude to its birds. In 1549 Donald Monro gives a fairly long account of St. Kilda,‡ but he had not been there, and his information was very imperfect ; all he has to say about the birds is that falcons and wild fowls build in this fair isle, and that McCloyd "his stewart, went there for dewties in miell (? meal) and reisted (dried)§ mutton, wyld foullis reisted, and selchis (seals)." With Sir Robert Sibbald it is different, for it can but be St. Kilda that he had in his mind when in his "Scottia Illustrata" (1684), in speaking of the Gannet, he wrote : "Non solum autem in Insula *Bassa*, sed & in *Alisâ* & aliis ex Æbudibus [Hebrides] nidulantur."*

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* *See* map, p. 38.

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* Lib. II., cap. X.

† "The Cosmographe and Description of Albion." Bellenden's edition, XLVII.

‡ No. 158 of Monro's list.

§ Jamieson, who quotes this passage, interprets "reist" to dry by the heat of the sun. "Scottish Dict."

1. The first authority on St. Kilda birds, and a good one, too, was Martin Martin. He lived in Skye, and was tutor and estate factor to the McLeod family, to whom the island then belonged, as it does now. Mr. J. Mackenzie tells me that in the vouchers for his salary still in existence at Dunvegan Castle, Martin is described as "Governor." He visited St. Kilda on the occasion of the Rev. John Campbell being appointed minister to the islanders, and has left posterity a little work of 158 pages of the highest interest to naturalists, entitled "A Late Voyage to St. Kilda," *by* M. Martin, *Gent.*, 12mo (1698), with a map, of which a facsimile is given.† A second edition of the "Voyage" was published in 1716, a third in 1749, and a fourth in 1753. I have had no opportunity of collating these editions, but I learn from Mr. W. H. Mullens that the fourth edition, though stated to be "corrected," is, as far as the birds are concerned, practically

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* In his "History of the Sheriffdoms of Fife and Kinross," published 1710, Sibbald says there are Gannets "in the desart Isles, adjacent to Hirta, called St. Kilda's Isle, and in a desart Isle belonging to Orkney," but Sibbald wrote this twelve years after Martin's work—to be mentioned next—was published.

† Martin's map, as well as the facsimile of the title-page to his "Voyage," are here borrowed from an appreciative article by Mr. W. H. Mullens in "British Birds" (1908, p. 173)

A LATE

VOYAGE

TO

St. KILDA,

The **Remoteſt** of all the

HEBRIDES,

OR

Weſtern Iſles of SCOTLAND.

WITH

A Hiſtory of the Iſland, Natural, Moral, and Topographical. Wherein is an Account of their Cuſtoms, Religion, Fiſh, Fowl, *&c.* As alſo a Relation of a late IMPOSTOR there, pretended to be Sent by St. *John Baptiſt*.

By M. MARTIN, *Gent.*

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the same as the first. In the same year as the second edition of Martin's "Voyage" was published, there also appeared a second edition of his "Description of the Western Islands of Scotland" (1716), which Mr. Mullens informs me is very much corrected from the first in 1703. In this "Description," which contains many references to natural history, the contents of the "Voyage" are somewhat abridged, but subsequently they were reprinted in full in the "Miscellanea Scotica,"* as well as by Pinkerton in his collection of voyages and travels, besides being largely copied by Buchan,† who was at St. Kilda in 1705.‡ Martin's narrative is not only the first which describes the birds of St. Kilda, but it is the first written by anyone from personal knowledge of the islands. In the preface, which was seemingly not written by himself, an account is given in vivid terms, of the difficulties and perils through which he, with his crew, passed in their voyage to the island. Eventually they were led by watching the flight of the sea-fowl to direct their course to Borrera, which they found covered with a prodigious number of Solan Geese,

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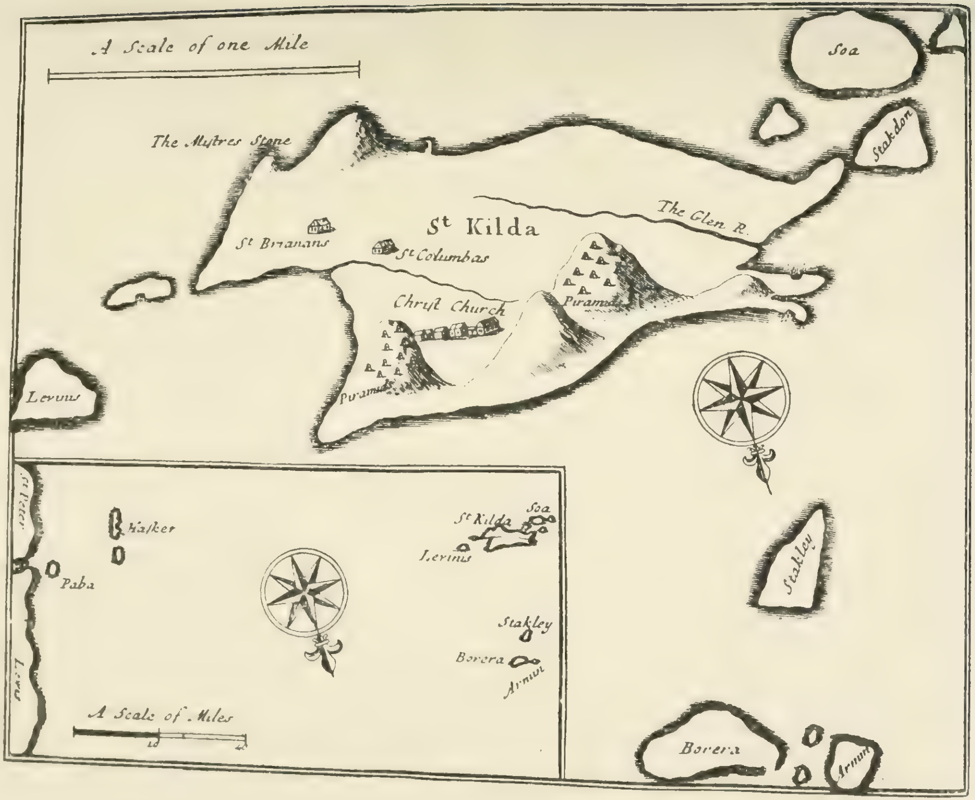
* (1818), II., p. 154.

† "Description of St. Kilda," by the Rev. A. Buchan, 1741.

‡ Besides this "Voyage" Martin had the year before written an earlier treatise on the North Islands of Scotland, for "The Philosophical Transactions" (1697, No. VI.).



A Scale of one Mile
Soa
Stakdon
The Miſtres Stone
St Kilda
The Glen R.
St Brianans
St Columbas
Chryſt Church
Piramids
Piramids
Levuus
Stakley
Borera
Armin
St Peter
Haſker
Paba
Soa
St Kilda
Levius
Stakley
Borera
Armin
Lewis
A Scale of Miles
10
40

and here after passing a night of anxiety they obtained a calm, and reached St. Kilda by rowing, two days later. The islanders, who numbered 180, received them with a "God save you," and assigned to them a maintenance, consisting partly of eggs, of which in three weeks, such was their liberality, they had bestowed upon them 16,000, of which a good many were the large eggs of the "Lavy," or Guillemot.* One wonders not so much at the islanders collecting 16,000 eggs, which would be an easy task, as at the capacity which Martin and his crew possessed to eat so many, but they had an astringent effect, and the men presently became costive and feverish. Eventually Martin and his coadjutor restored them all to health.†

Of Stack Lii, or "Ly," as he spells it, which Martin found an opportunity of visiting, though he does not say that he attempted to ascend it, he gives a rather full account, describing the rock as of a blueish colour at a distance, but when approached it proved to be "perfectly white with *Sòlan* Geese sitting on and about it."‡ The natives told him that Stack Lii afforded them five, six, or seven thousand Solan Geese in a year, provided the wind did not disappoint them of their harvest.

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* Eighteen eggs of the Lavy *per diem* for each man.

† *t.c.*, p. 65.

‡ p. 39.

Borrera, Martin informs us, fed 400 sheep in his time, "and would Feed more, did not the *Solan* Geese pluck a large share of the Grass for their nests" . . . . "There are about Forty Stone Pyramids in this Isle, for drying and preserving their Fowls, etc. These little Houses are all of loose Stones, and seen at some distance; there is also here a very surprising number of Fowls, the Grass as well as the Rocks filled with them. The *Solan* Geese possess it for the most part; they are always Masters wherever they come, and have already banished several Species of Fowls from this Isle."*

Of Stack an Armine, which abbreviating the preposition he spells "Stack-Narmin," Martin says: "this Rock is Half a Mile in circumference. . . . . This Rock abounds with *Solan* Geese and other Fowls; here are several Stone Pyramids, as well for Lodging the Inhabitants that attend the Seasons of the *Solan* Geese, as for those that preserve and dry them and other Fowls, etc."† He then describes his visit to Armine and his safe return from the Rock with 800 of the preceding year's dried Gannets, which after being cast together in a heap, were shared out to the men, each Gannet having a distinguishing mark on its foot, peculiar to the owner.

"The *Solan* Geese," says Martin, "Hatch‡ by turns:

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* pp. 42, 43. † p. 44. ‡ p. 50

when it returns from its Fishing [it] carries along with it Five or Six Herrings in its Gorget, all entire and undigested, upon whose arrival at the Nest, the Hatching Fowl puts its Head in the Fisher's Throat, and pulls out the Fish with its Bill as with a Pincer, and that with very great noise ; which I had occasion frequently to observe. They continue to pluck Grass for their Nests from their coming in *March* till the Young Fowl is ready to Fly in *August* or *September*, according as the Inhabitants take or leave the First or Second Eggs. It's remarkable of them, that they never pluck Grass but on a Windy day ; the reason of which I enquired of the Inhabitants, who said that a Windy day is the *Solan* Goose's Vacation from Fishing, and they bestow it upon this Employment, which proves fatal to many of them ; for after their fatigue they often fall asleep, and the Inhabitants laying hold on this opportunity, are ready at hand to knock them on the Head ; their Food is Herring, Mackrels, and *Syes* * ; *English* Hooks are often found in the Stomachs both of Young and Old *Solan* Geese, though there be none of this kind used nearer than the Isles Twenty Leagues distant ; the Fish pulling away the Hooks in those Isles go to St. *Kilda*, or are carried by the Old Geese thither ; whether of the two the Reader is at liberty to judge." The latter supposition is I think the more probable of the two.

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* The Coal Fish, *Gadus virens.*

"The *Solan* Geese," continues Martin, "are always the surest sign of herrings, for where-ever the one is seen the other is always not far off. There is a Tribe of Barren *Solan* Geese which have no Nests and sit upon the bare Rock ; these are not the Young Fowls of an Year Old, whose dark Colour would soon distinguish them, but Old ones, in all things like the rest ; these have a Province, as it were, allotted to them, and are in a separated state from the others, having a Rock Two hundred Paces distant from all other; neither do they meddle with, or approach to those Hatching, or any other Fowls. They Sympathize and Fish together ; this being told me by the Inhabitants, was afterwards confirmed to me several times by my own Observation. The *Solan* Geese have always some of their Number that keep Centinal in the Night-time, and if they are surprised (as it often happens) all that Flock are taken one after another ; but if the Centinal be awake at the approach of the creeping Fowlers, and hear a Noise, it cries softly, *Grog Grog*, at which the Flock move not ; but if this Centinal see or hear the Fowler approaching, he cries quickly *Bir*, *Bir*, which would seem to import danger, since immediately after all the Tribe take Wing, leaving the Fowler empty on the Rock." . . . . "The *Solan* Goose comes about the middle of *March* with a *South-West* Wind, warm Snow, or Rain, and goes away, according as the Inhabitants determine the time, *i.e.*, the taking away, or leaving its Egg, whether at the First, Second, or Third time he lays."*

In another place Martin says: "They preserve the *Solan* Geese in their Pyramids for the space of a Year, slitting them in the Back, for they have no Salt to keep them with. They have Built above Five hundred Stone Pyramids for their Fowls, Eggs, etc."† It is not surprising that with such a diet, a species of leprosy broke out, from which Martin found two families still suffering.‡

Martin commits himself to no guesses about the quantities of the birds, but says: "We made particular Enquiry after the Number of *Solan* Geese consumed by each Family the Year before we came there, [1696] and it amounted to Twenty two thousands six hundred in the whole Island, which they said was less than they ordinarily did, a great many being lost by the badness of the Season, and the great Current into which they must be thrown when they take them, the Rock [of Stack Lii] being of such an extraordinary Height, that they can not reach the Boat."§ I shall have more to say of these figures further on, as doubt has been thrown upon them. I have quoted from Martin's "Voyage" at some length because we have no other account of the Gannet of this date which is so good, and every credit is due to this early observer, in spite of the indifferent opinion held of him by the great lexicographer, Samuel Johnson.*

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* p. 55. † p. 114. ‡ p. 80. § p. 115.

2. The Rev. Kenneth Macaulay, or McAulay, as it was sometimes spelled† who visited St. Kilda in June, 1758—sixty-one years after Martin was there—has also left us a narrative‡ which can surely only be that of a man who had himself ascended one of the Gannet Stacks ; unless he allowed it to be very much over-edited by Macpherson, who, according to Johnson, put his materials into shape. As I have quoted at length from Martin, one extract from Macaulay will suffice :—

"The nests of the solan geese, not to mention those of other fowls, are so close that when one walks between them, the hatching fowls on either side can always take hold of one's cloths ; and they will often sit until they are attacked, rather than expose their eggs to the danger of being destroyed by the sea-gulls ; at the same time, an equal number fly about, and furnish food for their mates that are employed in hatching."

3. In "A Description of St. Kilda," by the Rev.

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* "No man now writes so ill as 'Martin's Account of the Hebrides' is written. A man could not write so ill if he should try." ("Life of Samuel Johnson," by James Boswell, IV., p. 97).

† *See* Boswell's "Life of Samuel Johnson," II., p. 350 (Croker's edition, 1831).

‡ "A Voyage to and History of St. Kilda," 1764.

Alexander Buchan, there is a lengthy account of the Gannet, but it is copied from Martin, so there is no need to quote it. Buchan went to St. Kilda in 1705, but his writings were not published until after their author's death ; as he was minister there for twenty-five years, according to Mr. Seton,* it is perhaps odd that he left so little original matter behind him.

4. The next to mention is the Rev. J. L. Buchanan, who, in his "Travels in the Western Hebrides from 1782 to 1790"—a volume published from his notes and not until after his death—indulges in a rather imaginative account of the Gannet, which seems to have been furnished him by one of the islanders, possibly the same individual, who, as our author tells us, "was one of the four men that catched four *itts*, or *pens*, being three hundred each, in the whole twelve hundred Solan geese, in one night."

Modern History of the Settlement.—As I have never been to St. Kilda I can say nothing of its Gannets from personal observation, but I have endeavoured to read up its literature, which is much more extensive than many would suppose, more especially with reference to birds, and to the fowling which is no longer practised as it was in days of yore. It would take up a good deal of space to enumerate all the books which treat, partially or entirely, of St. Kilda, but

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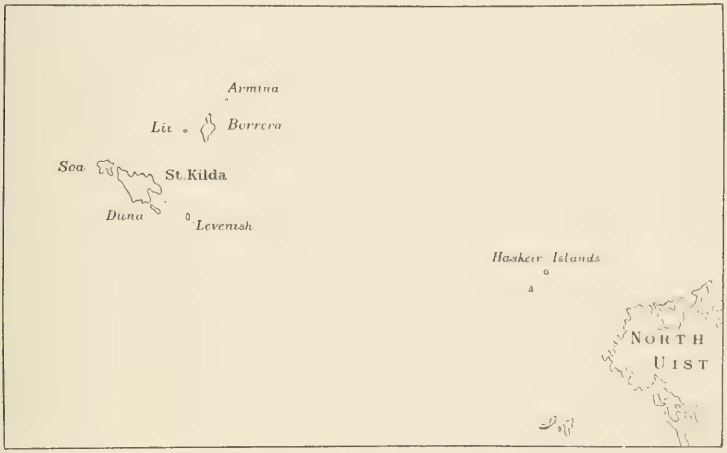
* "St. Kilda," by G. Seton, 1878, p. 19.

I cannot refrain from naming two which are much to be recommended: "St. Kilda, Past and Present," by George Seton (1878), and "St. Kilda," by Norman Heathcote (1900), which has an excellent map. The best two treatises on its birds are to be found in the posthumous journals of the Rev. Neil Mackenzie, who was minister on St. Kilda from 1829 to 1843, since published by his son in "The Annals of Scottish Natural History"*; and in a modest pamphlet of sixty-eight pages, entitled "St. Kilda and Its Birds," by Joseph Wiglesworth (1903), originally delivered as a lecture at Liverpool.


Armina
Lii
Borrera
Soa
St. Kilda
Duna
Levenish
Haskeir Islands
NORTH
UIST

THE ST. KILDA GROUP OF ISLANDS.

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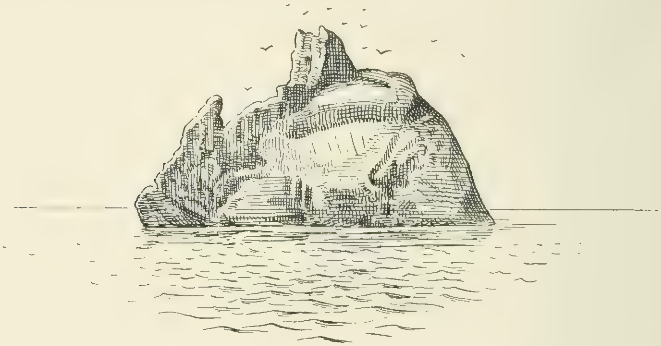
* 1905, pp. 75, 141.

The St. Kilda Gannetries, though commonly spoken of as if at St. Kilda, are says Dr. Wiglesworth, on the magnificent cliffs on the west and north sides of the much smaller island of Borrera, four miles further north, and on two precipitous stacks which rise out of the water near it, known as Stack an Armine, 592 feet high, and Stack Lii, 533 feet high. For photographs of Borrera, Lii and Armine, and other St. Kildian islands, I owe my thanks to the late Professor Newton. I must at the same time not forget to thank another friend—Mr. J. A. Harvie-Brown, whose knowledge of the Scottish islands is derived from many years' acquaintance with them— for a great deal of information.



BORRERA (AFTER SETON).

It is clear that there are more Gannets on these three islands than anywhere else in the world, and that we cannot be wrong in calling St. Kilda the Gannets' metropolis, yet on St. Kilda itself none breed, nor on the adjacent island of Soay,* nor, Mr. Harvie-Brown informs me, on Levenish.

The annual autumn raid which formerly took place on the young Gannets on Borrera, Lii and Armine must have been a slaughter indeed. Too helpless or too simple to move out of the cragsmen's way the "gugas," as they were called, sat still until a blow on the occiput from a club or a billhook despatched them, and they were then collected and thrown into the sea, where a boat picked up as many as were not washed away by the tide. In Martin's day the number of "gugas" thus collected ran into very big figures, even allowing for some pardonable exaggeration in the tales of the natives. Nowadays these young Gannets have an easy time of it, for they are hardly molested. Even when Dr. Wiglesworth was at St. Kilda he found that the regular raids on their great Gannet preserves had, in 1902, already been discontinued by the islanders, of so little use had the birds become. I am not aware that any ornithologist has ever been present at one of these August raids on the St. Kilda "gugas," although nearly every writer mentions them, nor would a scene of devastation and carnage, such as it must have been, be very attractive.

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* Dr. Wiglesworth tells us that Soay is the Petrel's island *par excellence.*

The taking of the adult Gannets was not of quite so much importance in the eyes of the St. Kildians, yet they were freely eaten, partly because, as the Rev. Neil Mackenzie declares,* they were easy to catch asleep, and this especially after a windy day, which they generally spent in gathering grass on the larger islands for their nests. "There is always," says Dr. Joseph Wiglesworth, "a sentinel awake for every group of Gannets, and the success or failure of the expedition hangs entirely on the capture of the sentinel. The men creep up very quietly to the spot, and take the opportunity of seizing the sentinel when he is off his guard, picking at his breast or preening his feathers; he is seized by the bill and his neck broken by throwing his head back. If the sentinel is disposed of all the other sleeping Gannets which are lying with their heads under their wings can be seized and killed without difficulty, provided no noise is made. As many as two or three score may thus often be taken one after the other."† If, on the other hand, the sentinel is not caught, the birds hear the men and are soon wide awake and off. It is perhaps more correct to speak of them as hard of hearing, than as slumbering. I have often made experiments with my tame ones when their heads were tightly tucked into a division of the

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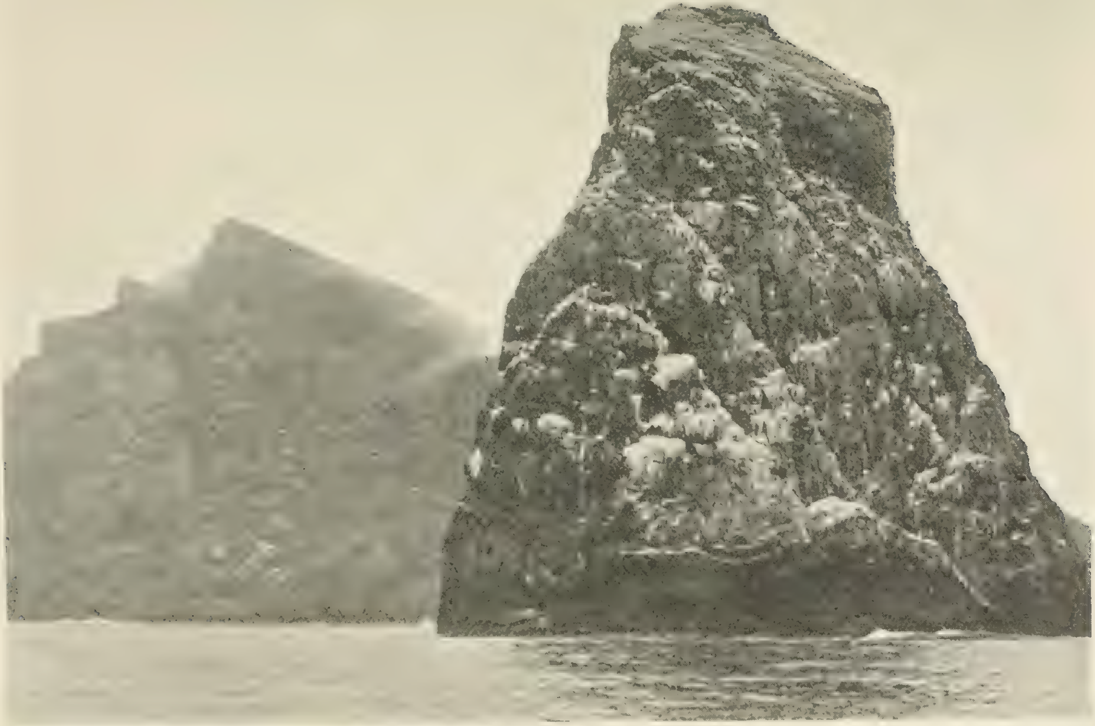
* "Annals Scottish N. H.," 1905, p. 144.

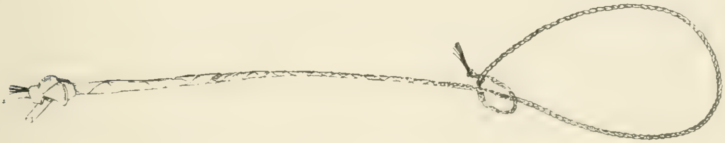
† "St. Kilda and Its Birds," p. 51.



STACK ARMINE, ST. KILDA.

feathers of the back, which in itself by deadening their hearing would contribute to making them deaf, and the smallness of their closely protected ears would further increase their difficulty in hearing.

Another effective plan of taking Gannets and other sea-birds—an old method practised by the St. Kildians in Martin's time,* and still in use among the islanders—is to catch them with a running noose at the end of a long tapering rod. For the loan of a couple of these St. Kildian snares I am indebted to Mr. J. Steele Elliott, who visited St. Kilda in 1894.† They are about fifteen inches long, including the noose, and appear to be made of horsehair and Gannets' quills deftly plaited together.‡



NOOSE USED BY FOWLERS IN ST. KILDA.

Fewer Gannets and other birds taken than formerly.—

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* "Voyage to St. Kilda," p. 106.

† *See* "Zoologist," 1895, p. 281.

‡ In Norman's "St. Kilda," there is an excellent photograph of a Gannet being caught in this way.

Whatever may have been the number of Gannets, young and old, captured by the natives in the seventeenth and eighteenth centuries, that number went on steadily decreasing until it had sunk in 1895 to the comparatively small figures of 1,280 young and 1,920 old ones—3,200, according to Mr. J. Young,* and even their feathers were no longer worth collecting.

Writing in 1902 Dr. Wiglesworth says: "Up to about twenty years ago enormous quantities of feathers [of Puffins, Gannets, etc.] were exported as payment for rent, or in exchange for meal and other necessaries, and immense numbers of birds were killed for the sake of their feathers alone. . . . . The feathers indeed were at that time their chief source of livelihood."† Their quality, however, varied. The feathers of a Guillemot were not very good. According to the Rev. Neil Mackenzie they were too close and short on the upper part of the bird, and too thin and deficient in curl on the under parts. One Gannet would yield as much feathers as ten Guillemots and of better quality.‡ The grease was also boiled down and used as oil to a large extent, but its value had begun to decline too.

In that same year—1902—the take was 300 Gannets, besides, of course, other birds, as I subsequently learnt from Mr.

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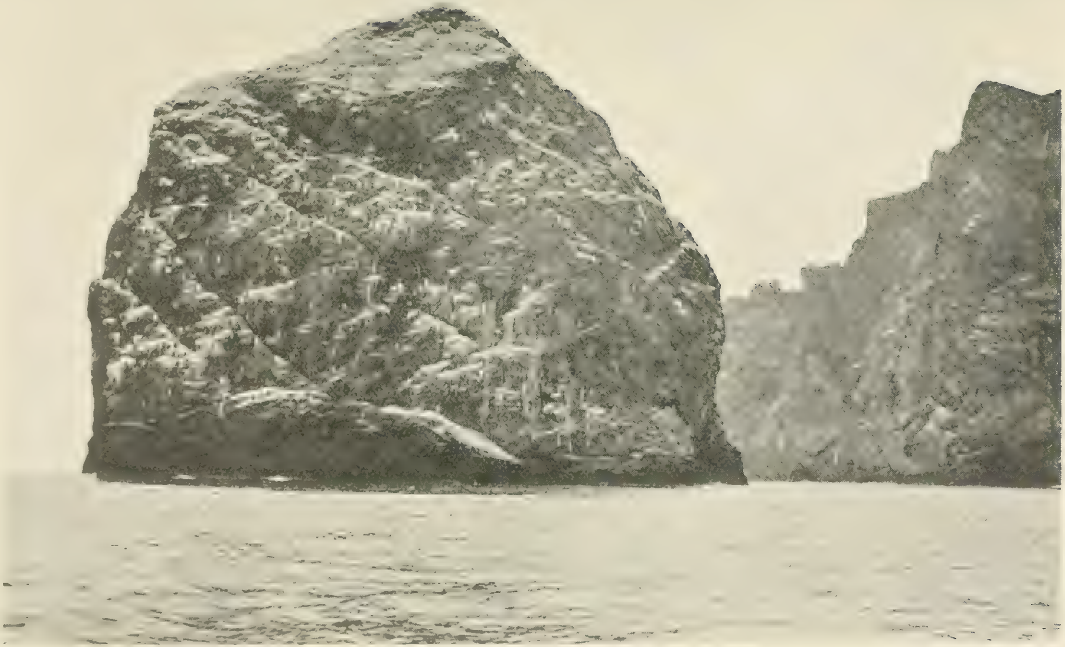
* "Annals Scottish N. H.," 1902, p. 87. † *t.c.*, p. 20. ‡ *t.c.*, p. 149.



STACK LII, ST. KILDA.

J. T. Mackenzie, who in seeking for a reason for the smallness of the number gathered, adds : "This does not arise from the birds becoming scarce—on the contrary they are very much on the increase—but owing to fall in the price of bird oil, brought about principally by the change from smearing sheep to the modern way of dipping with chemical dips." Dr. Wiglesworth, describing the process of obtaining the oil at a time when it was still in request, says : "[The gannets] were skinned, and the skin, with the adhering fat, was boiled, the oil rising to the surface and being skimmed off ; the fat inside the body of the bird was melted down by itself without boiling. The men used to get one shilling a pint for the oil, but now they can only get 4½d. offered for it,"* and at present they cannot get even that. There was a time when bird oil was in great demand, for in 1875 Mr. J. Sands says the export was nearly six hundred gallons,† but of course only a portion of it was derived from Gannets.

Number of Gannets at St. Kilda.—The late Mr. Henry Evans, who, from often yachting round the St. Kilda islands in summer, knew them well, used to say that as many Gannets as frequented the Bass Rock or Ailsa

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* *t.c.*, p. 50. A St. Kilda "pint" is equal to five English pints.

† "Out of the World, or Life in St. Kilda."

Craig might be taken away from the St. Kilda group without the population on its three great Gannet stacks, Borrera, Lii and Armine, being sensibly diminished.* This sounds a bold assertion, but Professor Newton, who accompanied him on five of these expeditions, gives it the sanction of his approval, by adding in the passage just quoted, " I am prepared to believe that there may be more Gannets there [*i.e.*, on the three stacks] than in all the rest of the world beside."† At first this may seem to some readers an inordinate supposition, but it is confirmed by what others who have been to St. Kilda tell us, and in proof of that it is only necessary to cite the testimony of such observers as John Macgillivray, Harvie-Brown, Elwes, Mackenzie, Kearton, Wiglesworth, Dixon, Heathcote, Milner,‡ and others, who have been to St. Kilda, and written about its Gannets. The latest ornithologist to visit St. Kilda with whom I have had any communication is Mr. O. G. Pike, who was there in 1908. Writing as to the serried ranks of Gannets which dot every part of Stack Lii, he says the effect on its sloping table-like top is simply marvellous, every place seeming to be occupied by a bird, adding that when he got among them, the Gannets, greatly alarmed and unable to use their wings, scrambled away down the cliff in one confused struggling heap.*

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* Quoted from " Ootheca Wolleyana " (II., p. 456).

† *l.c.*, p. 457.

‡ W. Macgillivray, "British Birds," V., p. 414; J. A. Harvie-Brown, "A Fauna of the Outer Hebrides," 1888, p. 94; H. J. Elwes, "Ibis," 1869, p. 30; Neil Mackenzie, "Annals Scottish N. H.," 1905, p. 145; Richard Kearton, "With Nature and a Camera," 1898, p. 90; J. Wiglesworth, "St. Kilda and its Birds," p. 48; C. Dixon, "Ibis," 1885, p. 91; Heathcote, "St. Kilda," 1900; Milner, "Zoologist," 1848, p. 2058.

The first question which is before us is whether Martin's high figures are reliable, and in considering them it must be borne in mind that in 1696 St. Kilda had twice as many inhabitants as it has now—about 180—and the harvest of sea-birds was almost their only means of sustenance. Martin tells his readers that he judged 22,600 Gannets to have been consumed by the people in one year—the year 1696.† This total was arrived at by "particular enquiry after the Number of Solan Geese consumed by each Family," a very proper mode of calculation if carried out correctly. And in another place he says that Stack Lii alone furnished five, six, or seven thousand Gannets in a year, according as the weather permitted the men to collect them,‡ and that altogether they had 500 "pyramids," or cairns of stones for their fowls and eggs.§ And in his "Description of the Western Islands of Scotland" (1703), he further says, "the Inhabitants commonly keep yearly above twenty thousand young and old [Solan Geese] in their little stone Houses."[*]

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* This reminds one of Audubon's description, which has been commonly held to be exaggerated ("Orn. Biography," IV.).

† "Voyage to St. Kilda," p. 115. ‡ p. 40. § p. 114.

Secondly, in 1758 there is the testimony of Kenneth Macaulay that 20,000 Gannets, including the young ones, which no doubt formed the bulk of the spoil, were still taken annually by the islanders. As Macaulay is known to have been to St. Kilda he presumably obtained his information first hand, even though it may have been (as was subsequently asserted) Macpherson who wrote most of his book for him when he came back.[†] If we accept Macaulay's figures as an independent testimony, and not as being merely copied from Martin's "Voyage" by his editor Macpherson, they afford tolerable confirmation of what Martin tells us, being only 2,600 short of his figures.

Thirdly, we have also the statement of the then minister on St. Kilda to Mr. James Wilson, made apparently prior to 1827, that 15,000 Gannets had been captured there in a few weeks,[‡] but that is 7,600 less than Martin's estimate of what were taken in a year.

At first sight one is inclined to credit Martin's figures, corroborated as they are by Macaulay, and partially by Wilson, but great doubt has been thrown on them by one who is entitled to speak with authority, the Rev. Neil

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[*] p. 281.

[†] *See* p. 127.

[‡] "Voyage round the Coast of Scotland," 1842, II., p. 59.

Mackenzie, minister to the St. Kildians from 1829 to 1843. "Never since I came to the island," writes Mr. Mackenzie, "have they [the natives] killed in any year more than two thousand 'gugas' [young Gannets], and about the same number of old birds. About eighty of the old birds will yield a stone of feathers (24 lbs.). Last year (1840) they only secured a little more than twenty stones [– 1,600 Gannets]. It takes on an average eighty 'gugas' when salted to fill a barrel. In general they are very fat, but some years they are quite lean and comparatively worthless.* This is also true of all the birds which frequent the island; some years they are much leaner than others. From the information which I got from the natives, I do not believe that they ever in any one year killed more than five thousand 'gugas' [young Gannets], and from two to three thousand old birds. There is no reason why they might not, if they liked, kill in a year five thousand 'gugas' and four thousand old birds."†

This would be 9,000 Gannets altogether, as against Martin's 22,600, Macaulay's 20,000, and Wilson's 15,000. Wherein lies the truth in these conflicting figures it is hard to say, but I think we may hold that what Mr. Wilson was told by the minister of the island in 1827 was not far above it, viz., that at that time when the population was twice as numerous as it is now, the take of Gannets in round numbers approached 15,000.

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* In another place he says that Gannets are fat in March but very lean in October.

† "Annals Scottish N. H.," 1905, p. 145.

Fourthly, another good naturalist and recent visitor to St. Kilda, who has made an attempt, which is evidently a well-considered one, to arrive at a just calculation of the number of Gannets at the present day, is Dr. Joseph Wiglesworth.* He was at St. Kilda in June, 1902. Speaking of Gannets, he says: "This bird breeds in enormous numbers in one locality only of the group, viz., Stack Lii and Stack an Armin, and the adjoining cliffs on the west and north sides of Boreray. It is not resident, leaving the rocks after the young have flown, and is very rarely seen about in the winter. The largest concentration of these birds relative to area is on Stack Lii, the entire top of which is perfectly white with them, as well as the encircling ledges; but Stack an Armin is not greatly inferior to its neighbour in this respect, although the birds are definitely less numerous there. On the cliffs of Boreray there are as many birds as on the Stacks, but these being spread over so much greater an area, the effect is not so striking. A few birds [*i.e.*, Gannets] are seen about the Stacks where they breed early in March, and by the end of that month the rocks are fully tenanted. In April they set about making and repairing their nests. They begin to lay sparingly in favourable seasons at the end of April, but the eggs are not obtained in any numbers before the first or second week in May. Fully a fortnight will elapse from the time of the first birds laying, before eggs are found in all the nests. On the occasion of my visit, on June 10th [1902], the sloping faces on the top of Stack Lii were crammed with nests as thick as they could be placed, every available spot between the projecting angles and slabs of rock being thus occupied. Almost every nest contained a single egg, the great majority of which were stained a deep brown colour, and these were all, so far as they were tested, considerably incubated, the embryo being formed, but not of large size. . . . I endeavoured to form some sort of estimate as to the number of Gannets resident in St. Kilda during the summer by ascertaining the number of eggs taken. On May 14th there were taken from the top of Stack Lii (from the summit only) 1,400 fresh eggs; the great majority of the birds had then laid, but some nests were still unoccupied. Perhaps, then, 1,500 nests might represent the number on the sloping faces on the top of this Stack only. But the men say that on the whole of the rest of this Stack there are more nests than on the summit, and if this be so, the total number of nests on Stack Lii may perhaps be put at 3,500 to 4,000. On Stack an Armin, though the birds are very numerous, they are appreciably less so than on Stack Lii, and the number of nests may perhaps be put at about 3,000. On the cliffs of Boreray the natives consider that there are more nests than on the two Stacks put together, and the number may therefore be approximately reckoned at about 8,000. Doubling the number of nests to get the number of birds, and allowing for a fair sprinkling of non-breeding birds, of which the natives say there are a good many, we get a total of some 30,000 birds. This estimate is much less than that given by some writers, and it of course does not pretend to be more than a rough calculation. It probably errs on the side of deficiency, but at the same time it has to be borne in mind that 1,000 birds of the size of a Gannet make a big show, and a mere cursory view of their numbers would probably lead to an over estimation."

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* "St. Kilda and Its Birds," 1903. This little book is the fullest account of the birds since Martin's.

The above is what is offered to us by Dr. Wiglesworth as the result of his observations, and we are not likely to come by a better estimate. Moreover, Dr. Wiglesworth's figures are nearly sufficient to justify Martin's figures. Yet Martin's figures, and Macaulay's also, do in fact necessitate a considerably higher Gannet population than the 30,000 suggested by Dr. Wiglesworth, because we may be positive that the islanders of the seventeenth century could not have caught all the young Gannets there were, or more, let us say, than a tenth part of the old ones. Such a number as Martin's 22,600 requires therefore that there must have been about 45,000 Gannets altogether, if not more, inhabiting the St. Kilda islands in 1697. Now there is no reason to think there are less at present than there were in the seventeenth century. The contrary is more probable, at least since 1900, when the young ones ceased to be worth collecting. Accordingly there must have been some unintentional exaggeration on Martin's part, though in most things he was an accurate observer and recorder. But here he must have been misled by the tales of the natives. Whilst admitting it was so, I think we may at any rate believe in from 12,000 to 15,000 Gannets having been gathered, which latter is the figure Wilson gives us.

Accepting as the status of this Gannetry now, the figures put forward by Dr. Wiglesworth, though I think they must be under the mark, let us reckon that there are now at least 30,000 Gannets in the St. Kilda islands; of which, following the proportions indicated by him, and acquiesced in by the late Professor Newton, 16,000 may be assigned to the island of Borrera, 8,000 to Stack Lii, and about 6,000 to Armine.

Puffins and other Birds.—With regard to the other species of sea-fowl which inhabit St. Kilda, the Guillemot, Razorbill and Fulmar Petrel are excessively numerous. The Rev. Neil Mackenzie had seen thirty-one baskets of Guillemots' eggs, each containing four hundred,—which makes 12,400,—collected in two gatherings on the little island of Stack Biorrach.* As for the Puffins at St. Kilda, Dr. Wiglesworth declares that they are simply incalculably numerous, far above any other species of bird which inhabits the island, a statement which is in every way confirmed by Mr. Mackenzie,† who adds that the number of Puffins and their eggs which used to be taken during a season,—men, women, boys, girls, and dogs all pursuing them,—was incredible. But Puffins swarm in many places besides St. Kilda, and it may well be that numerically they are the dominant species of European bird.‡

Large Quantities of Fish.—I have already alluded to the quantity of fish found near Ailsa Craig (p. 103), and I believe it is a fact that herrings and other fish are equally abundant near St. Kilda, which makes it a favourite fishing ground with the trawlers. Indeed, Norman Heathcote speaks of a trawler said to have cleared £10,000§ in the vicinity of these islands, as the result of a very successful season's fishing. On this subject Mr. John Paterson has favoured me with a communication from Mr. Mac Iver, of Stornoway, who, being a very large herring-merchant, is an authority on such matters, and whose experience is that "there are any number of trawlers working off those grounds," *i.e.*, the west Hebridean coast, and vicinity of St. Kilda and the Flannan Islands. In his opinion "it is splendid ground for trawlers, and they almost every day of the year frequent the place," landing their fish for the most part at Aberdeen, Hull, and Grimsby, and a few at Castlebay.

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* Annals Scottish N. H. 1905, p. 149. † *t.c.*, p. 151.

‡ Yet the Puffin only lays one egg. No doubt this superabundance is partly accounted for by the fact that the annual slaughter of them for eating, which formerly took place, has nearly ceased.

§ "St. Kilda," p. 208.

The presence of a plenitude of fish is further confirmed by inquiries made of the Fishery Board (Edinburgh), where, by the courtesy of the secretary, I have been enabled to elicite a few particulars as to the quantity of herrings taken by Scotch boats only, in St. Kildian waters, and to the west of the Hebrides :—

In 1904 about 800,000 herrings were brought to port.
,, 1905 ,, 3,500,000 .. ..
,, 1906 ,, 1,800,000 .. ..
,, 1907 ,, 100,000 .. ..

Haddocks are also very abundant, and the boats bring in large quantities, as well as many other fish.

Now it is undeniable that all this abundance of fish is a proof beyond gainsay that fish and sea-birds can exist and multiply together in the same area. Here is a case in which herrings, haddocks, pollack, saithe, etc., go on replenishing their numbers year after year, in spite of the presence of one of the largest—if not the very largest—armies of sea-birds existing in the northern hemisphere. The inference, it is plain, can only be that the fecundity of sea-fish, which is under favourable circumstances something altogether incredible, has shown itself for centuries to be more than equal to the enormous demands made upon it by the legions of birds at St. Kilda. Speculations may not be worth much, but I venture to think that if half the Gannets inhabiting the British Isles were destroyed, and half the Shags and Puffins, it would not make any appreciable difference in the amount of fish left for human beings!

Sulisgeir.

Its Early History.—We are not altogether ignorant of the early history of this lonely rock, thanks to Dean Monro,* who has left us his description of so many Scottish islands, including Sulisgeir, which he calls Suilskeray, which is its English equivalent. Sgeir, writes Professor Newton, is "merely the Gaelic adaptation of the old Norsk *Sker*= Skerry—a small island which may or may not have precipitous cliffs: Sgeir and Skerry are actually the same word—one being the Gaelic, the other the English form. The modern Norwegian is *Skier* or *Skiær*." Dean Monro

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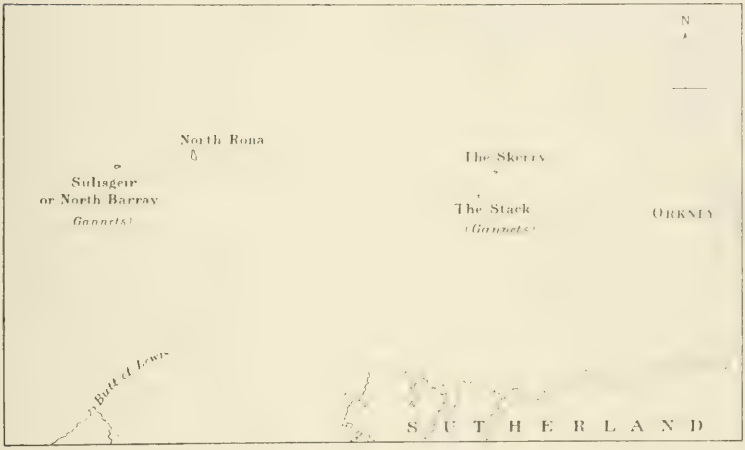
* Donald Monro, High Dean of The Isles; he travelled among them in 1549, but his account of them was not made public until 1774. Sulisgeir is the last on his List, No. 209. His description of it has been made use of in "Geographiæ Blavianæ volumen sextum," 1662; for a transcript of the passage I am indebted to Mr. H. S. Gladstone.


N
North Rona
Sulisgeir
or North Barray
(Gannets)
The Skerry
The Stack
(Gannets)
ORKNEY
Butt of Lewis
SUTHERLAND

POSITION OF SULISGEIR AND THE STACK.

does not mention Gannets by name as being on this island, though what he says about "wylde foulis" may be taken as applying to them. He says: "This ile is full of wylde foulis, and quhen foulis hes ther birdes [*i.e.*, young ones] men out of the parochin of Nesse in Lewis use to sail ther, and to stay ther seven or aught dayes, and to fetch hame with them their brith [boat] full of dray [*i.e.*, dried] wild foulis, with wyld foulis fedders."

This island of Sulisgeir, which is only half a mile in length, has been also known by the names of North Barra and Suliskerry, but Mr. Harvie-Brown tells me that the latter designation is more fitly applied to the true Sule-Skerry (" Stack and Skerry "), lying much nearer to the Orkneys, and to be next described. So that there has been a certain amount of confusion which Mr. Harvie-Brown, who has visited all these islands, has been instrumental in clearing up. We only possess two accounts of the ornithology of Sulisgeir, firstly that by Mr. John Swinburne,* and secondly that by Mr. J. A. Harvie-Brown,† but these authors are excellent naturalists and tell a great deal which is of value about this island rock.

Mr. John Swinburne was on Sulisgeir in June, 1883, and Mr. Harvie-Brown was there in June, 1887; the latter states that it is chiefly the southern and eastern faces of the island which are tenanted by Gannets, which there occupy the rocks and ledges by thousands. "Nearer the cliff," says Mr. Harvie-Brown, whose visit was made shortly after a wholesale killing by the men of Ness had taken place, "and between the looser fragments and the edge, the rocks are white with, and deep in, Gannets' excrement, and the big clumsy nests, some few with fresh clean, many more with rotten or hard-set eggs, or young in various stages, squelch beneath the tread almost ankle-deep. It is easy to clamber, and even to run here, at least in dry weather, because the foothold is good. The stench was overpowering, but what must it be in wet weather would beggar description. The nests were masses of putrid seaweed. Sulisgeir is indeed a desolate isle. To the left of the landing-place a big spur runs out, populated all over as above described. A number of rudely constructed stone huts, tolerably comfortable and wind-proof—about a dozen in all—have been erected for refuge houses by the Ness men, who come over to take the eggs and birds. Their visit this season must have been recently paid, as close round the huts lay innumerable Gannets' heads; . . . . The Leac rock or flat-headed spur of the southern gable-end of Sulisgeir is covered with Gannets, as is the whole east face and the somewhat rounded off, or terraced, tops of the solid cliff, and certain spots also of the western face. . . . . At every second Gannet's nest lay a herring or two fished up from the deep."

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* Royal Physical Soc. Edinburgh, VIII., p. 51 (1883-5).

† "A Vertebrate Fauna of the Outer Hebrides," 1888, p. lii.

Sulisgeir's wild and rugged aspect is well shown in the photographs taken for Mr. Harvie-Brown by Mr. W. Norrie, one of which I have Mr. Harvie-Brown's permission to make use of. It will be observed that nearly all the Gannets which are on their nests are facing the same way, and that the uncovered nests are very substantial, and of considerable diameter.

Number of Gannets on Sulisgeir.—As regards its Gannet population Mr. Harvie-Brown was of opinion that when he was there in 1887, Sulisgeir surpassed both the Bass Rock and Ailsa Craig in numbers (*t.c.*, LII.). Mr. Harvie-Brown tells us that in 1884 two boats' crews from Ness took 800, 1,000 and 1,000 young Gannets in three consecutive days —2,800 in all, and Mr. Swinburne says as many as 3,000 have been taken in a single season (*t.c.*, p. 65). This number seems to have been maintained, and as recently as 1898 the number taken according to the harbour-master of Ness, Mr. John Macleod, was still about 2,500. This is at least 700 more young Gannets than have ever been taken on the Bass Rock, but in making a comparison it must be said that the nests on Sulisgeir are more accessible—judging from the accounts and Mr. Norrie's photographs—than on the Bass. Now, 2,800 young Gannets would have had 5,600 parents, and if we allow 2,400 more for Gannets with inaccessible nests, which Professor Newton, who had these figures before him, thought was ample, it gives a Gannet settlement of 8,000. This is putting it higher than the Bass Rock, or Ailsa Craig, and at that I think I am justified in reckoning it.

SOLAN'S ROCK, SULISGEIR.

The Stack of "Stack and Skerry" or Sule-Skerry.

Lying nearly forty miles to the west of the Orkney Islands, and some thirty miles north of Sutherlandshire, are two small island rocks, known collectively to mariners as Stack and Skerry, but of which the larger is, Mr. Eagle Clarke tells me, termed Sule-Skerry in the Ordnance Gazetteer, and the other is correctly its "Stack." The distance between them is as much as four miles, and the Stack is believed to cover about six acres.

1. Donald Monro does not mention the Stack of Sule-Skerry in his list of islands, and the first allusion to it, which is of a somewhat vague nature, is from Sir Robert Sibbald, who, in his "History of Sheriffdoms of Fife and Kinross" (1710), which contains a very good account of the Gannet, speaks of there being these birds "in a desert Isle belonging to Orkney." This can hardly mean anything but the Stack of Sule-Skerry.

2. The next mention of the Stack which we come across is in the "British Zoology," where, among the Gannets' breeding places Pennant names briefly "the stack of Souliskerry near the Orkneys."* That he had the Stack and not Sulisgeir, of which he makes no mention, in his

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* "British Zool.," 4th ed., 1776; II., p. 614.

mind is proved by his subsequently giving ten leagues as its distance from Hoy.*

3. The next to quote is the Rev. George Low, who says in his "Fauna Orcadensis"† (1813): "The Solan Goose breeds in none of the Orkney Isles, as far as I can learn. . . . . The nearest land to Orkney where the Solan Goose breeds is a rock called the Stack of Soliskerry, where many hundreds breed every year, as the seals do on the Skerry. Some time ago a ship went from this place thither, and returned with a great quantity of young Solans, the feathers of which were good, as they were not near so oily as those of the older sea-fowl; the birds were eaten, but were very wild and fishy-tasted, with a strong smell."

Mr. Harvie-Brown considers the Stack to be "certainly one of the most inaccessible of all our Scottish islets, the difficulty of landing lying not only in its open and exposed situation, but in the fierce *röst*, or rush, of tideway which flows round its base." Mr. Harvie-Brown has tried to land on this dangerous and unapproachable Stack three times, but in vain, but he has sailed very near it. He heard on good authority that Joseph Dunn, who was formerly a bird-dealer at Stromness, had succeeded in landing on it several times, but to do so the calmest weather is necessary.

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* *i.e.*, thirty miles, *see* the "Caledonian Zoology," prefixed to Lightfoot's "Flora Scotica," 1777, p. 46.

† p. 148; Low's "Fauna" was published eighteen years after its author's death by Dr. W. E. Leach, who says the MS. was revised by Pennant; accordingly it may have been from that source that the latter's information was derived.

I am indebted to Mr. Dick Peddie for a photograph of the Stack, done in July, 1908, and also to Mr. John Pedder, for enlarging a sketch of Mr. Harvie-Brown's which he made from his yacht in 1887 when approaching the Stack from S.S.E., at the distance of about a mile.

[*Photographed by Dick Peddie, July, 1908.*

THE STACK.

Mr. Harvie-Brown when he was there, noticed that "the glasses revealed a very considerable proportion of dark birds amongst the white ones ; and, on the wing, immature birds of the first, second, and third year were clearly distinguished, and almost constantly in sight."* This was at the beginning of July, 1887, and a similar preponderance of young ones was remarked by Professor Newton, and Mr. H. Evans, when they were at the Stack but did not land on June 28th, 1890. At such a date young Gannets of the year would hardly be expected to be half-grown, yet it may have been a very early season, but any strong enough to be on the wing were probably birds of the preceding year.

Number of Gannets on the Stack.—With regard to the Gannet population on the Stack I may first quote a letter from Mr. N. A. McIntosh, a former principal of the lighthouse on Sule-Skerry, who says in reply to some queries : " I have been asking the captain of the tender which attends our lighthouse as to the probable number [of Gannets], as he had the opportunity of viewing them often on the wing, having frequently passed quite close and fired rockets to rouse them. He tells me the estimate could safely be put down at from 8,000 to 10,000." This may be a more or less accurate guess, but as has been shown before, guesses are more apt to be over the mark than below it. Mr. McIntosh also says : " For

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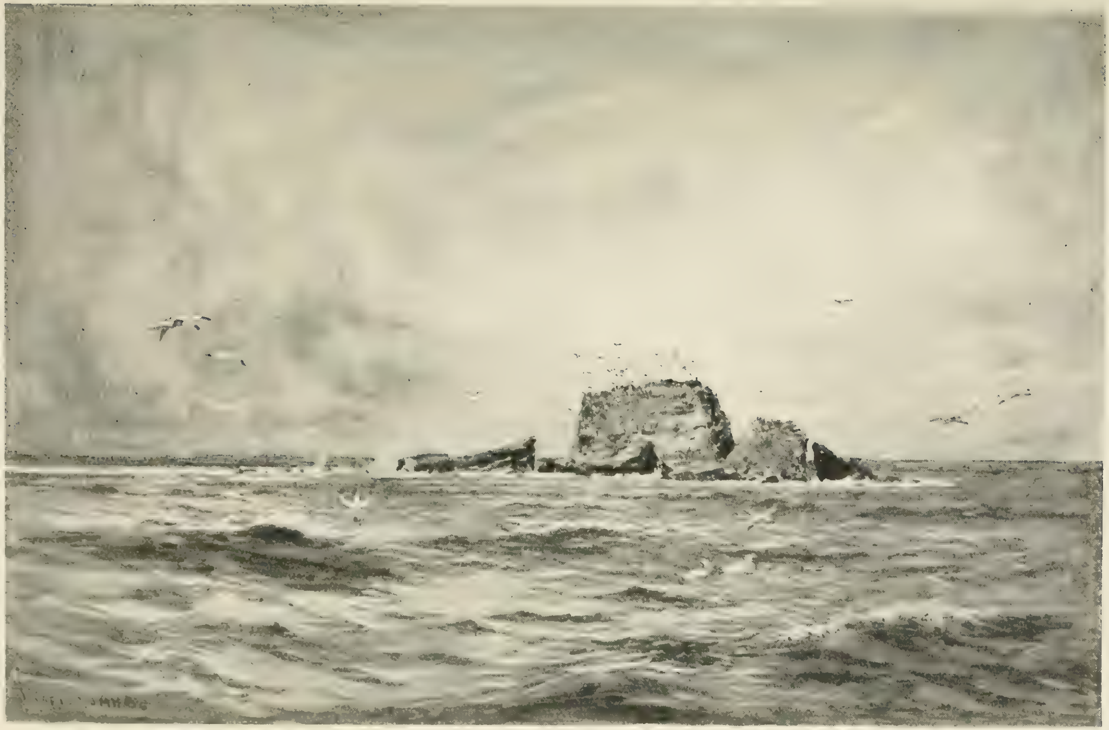
* "A Fauna of the Orkney Islands," by Harvie-Brown and Buckley, p. 160.



[*Drawn from a Sketch by J. A. Harvie-Brown by J. Pedder.*

STACK OF SULE-SKERRY.

a number of years back a boat has come from the island of Lewis to take as many of the young birds as they can reach.* These are generally taken in August, and the number never exceeds 1,000, for the reason that only a small portion of the rock is accessible." The whole extent of the Stack, he thinks, is as much as six acres, reckoning down to the water-line. Mr. Harvie-Brown, while cautiously abstaining from committing himself to an estimate, says : "The entire summit . . . . is densely populated by Gannets ; and on the north-west side they are equally numerous upon certain broad shelves. . . . . The isolated portions at the ends also are covered with the birds [Gannets] to even lower elevations above the sea, but on the west side, where it is more precipitous and a smoother rock, there is very little bird-life." Another witness, the late Mr. James Tomison, who was seven years at the lighthouse on Sule-Skerry, and from whom Mr. Eagle Clarke obtained an account of its birds,† says, when speaking of the Stack, that the rock is simply covered to its summit with Gannets, and thousands continually on the wing going to and returning from fishing. They have never nested on Sule-Skerry, but every year he says a few settle on the Skerry, probably during fogs, and being unable to rise from the ground generally die there. So little that is definite is known at present about this settlement of Gannets, and the numbers which compose it, that I am afraid of rating it higher than 5,000, but its strength must be more than that if 1,000 young ones can be gathered from only a small portion of the Stack.*

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* In 1903 or 1904 the boat from Ness was wind-bound on the coast of Sutherlandshire, and was several weeks in getting back to Lewis, and Mr. McIntosh was told that the men were not going to the Stack any more—having had enough of it!

† *See* "Annals Scottish N.H.," 1901, p. 97.

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* In another chapter I propose citing a number of statistics of Gannets seen, for the most part in bands, passing the Butt of Lewis, Cape Wrath, and Pentland Skerries; these statistics were all kept for Mr. Harvie-Brown by lighthouse keepers, who have exceptional opportunities for watching.

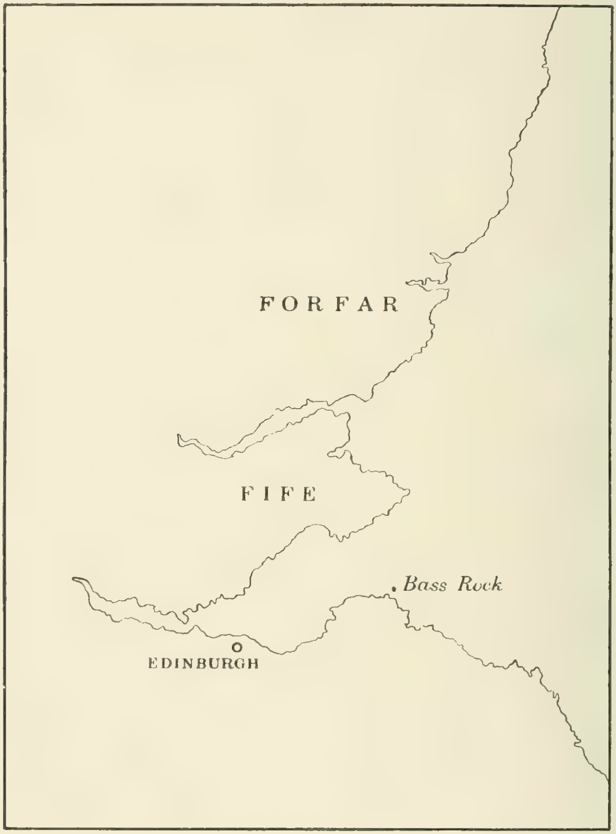
THE BASS ROCK FROM THE MAINLAND.

CHAPTER VI.

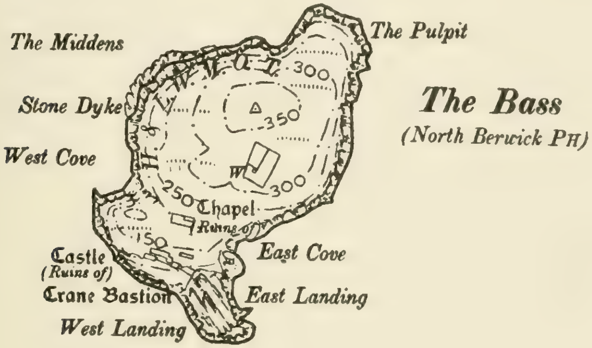
THE BASS ROCK.

The Bass Rock—History of its Gannets from the earliest times—As bequeathed to us by historians and travellers—Beginning with "The Scotichronicon," in 1447—Quotations from authors and criticisms on their credibility.

Early History of Bass Gannets.—It will be readily admitted that it is worth while reciting the strange old stories,—bound up as they are with many facts and some legends,—which travellers and historians of the Middle Ages have bequeathed to us about the Bass Rock and its remarkable birds; and as they can hardly be curtailed without spoiling their quaintness, it is necessary to give them in some detail. I shall, therefore, make no scruple in occupying this chapter with some long extracts, and it will be found that they will well repay the trouble of perusing with some care and attention. A certain amount of repetition must, therefore, be pardoned in this chapter, yet to avoid this as much as possible I have resolved, except in a few cases, not to give the Latin originals, but only a careful translation of them. There is much which might here be dwelt upon with great advantage, besides the natural history of the Bass, but this is hardly the place in which to enlarge on the former strength and importance of the Rock, as a fortress and a prison, grim and curious enough as is this aspect of its history. All that strange recital has been admirably told, with many details, in the Rev. Thomas M'Crie's "The Bass Rock: Its Civil and



Ecclesiastical History" (1847), a volume which, besides civil matters, contains a valuable contribution to the history of the Gannet from the pen of Professor Fleming.* To this work I would refer the reader for a great deal of erudite information of the highest value. Among the documents brought to light by Mr. M'Crie, not the least interesting is a Charter of 1316, granting the Bass Rock to Robert Lauder. Unfortunately this relic of antiquity, in which the Bishop of St. Andrews confers upon the said Lauder "all liberties, commodities, and easements" appertaining to the Bass, makes no mention of the Solan Geese; nor have we a single work which describes, or even refers to Bass Gannets earlier than Fordun's


The Middens
The Pulpit
Stone Dyke
The Bass
(North Berwick PH)
West Cove
300
350
300
250
Chapel
(Ruins of)
150
Castle
(Ruins of)
Crane Bastion
West Landing
East Cove
East Landing

THE BASS ROCK (ORDNANCE SURVEY).

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* Another useful book is "The Bass Rock, and its Story," by L. A. Barbé, 1904.

"Scotichronicon,"* which is long subsequent to our first knowledge of the Lundy Gannetry. In 1493 the name of another Robert Lauder again comes before us in connection with Bass Gannets, as will be mentioned presently under that date, and in 1675 the journal of a Sir John Lauder contains this entry—"For a Solan Goose 29 pence," but the Sir John Lauder of that day did not own the Bass.

Before entering on the history of the Bass Gannets, it is due to the memory of the late Professor Newton to acknowledge his great assistance in searching for, translating, and explaining many of the passages in this chapter. In 1865 he had already greatly interested himself in an inquiry of the same nature, undertaken by Professor Cunningham (*see* "Ibis," 1866, p. 1), to whom,—about the Bass Rock especially,—he must have given no small assistance. To the result of Professor Cunningham's diligent labours I have already referred, and again gladly acknowledge the use which they have been to me, and I wish to thank Mr. J. Paterson, Mr. A. H. Evans, Mr. William Evans and Mr. Southwell for their help also.

Fifteenth Century.—1. There is no earlier mention to be found of Gannets on the Bass Rock than that contained in "The Scotichronicon," a work ascribed to John de

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* Or Scotichronicum.

Fordun, a priest of Aberdeen. The passage in question, which has been already brought to the notice of ornithologists by Professor Cunningham,[*] is from the Cupar Codex, now in the Advocates' Library, and is a note alluding to three islands in the Firth of Forth, viz., the Bass, Fotheray[†] and May, and runs thus: "Hæ fusius traduntur in codice Cuprensi, *lib.* I. *cap.* 29, his verbis: 'Insula de Bass, ubi solendæ nidificant in magna copia: cujus protector exstat Sanctus Baldredus,[‡] Sancti Kentigerni olim suffraganus; . . .'" This passage is not in the text of "The Scotichronicon," but in a footnote.[§] The late Dr. W. F. Skene considered that the Cupar Codex was written about 1447, by Walter Bower, abbot of a monastery on Inchcolm, who is known to have been the continuator of Fordun's famous work; 1447, therefore, must be taken as the approximate date of the record.

2. The next mention of Bass Gannets arises from threatened litigation in a disputed ownership. This is to be found in a Commission from Pope Alexander VI. to investigate a claim, bearing date May 10th, 1493. The

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[*] "Ibis," 1866, p. 1.

[†] By Fotheray, Mr. William Evans thinks the little island of Fidra was intended, but I did not see any remains of a monastery when visiting it.

[‡] What are called the ruins of St. Baldred's chapel probably mark the spot where the hermit's cell stood in 606.

[§] But the footnote is not to be met with in all editions; it is here quoted from Godall's edition, 1759. Liber I., cap. VI., *note.*

[‖] *See* "Historians of Scotland" (Edinburgh), 1871. I., p. xi., preface.

claim in question is made by the Prioress of North Berwick, the ruins of whose priory are still to be seen there, against Robert Lauder, of the Bass, for certain barrels of grease. Probably this was an annual payment—something in the nature of tithe, and may have been the origin of the twelve Solan Geese which the minister of North Berwick is to this day, if he choose, entitled to receive as vicar of the Bass. The original of this document, which has been already brought to the notice of naturalists in the "History of the Berwickshire Naturalists' Club" (VII., p. 88), and again in "The Birds of Berwickshire,"* is stated by Dr. John Stuart to be preserved in the General Register House a Edinburgh. The actual words, I am informed by Mr. J. Anderson, are, "pinguedinis auiūm silvestrum." As already set forth, it was 177 years before this, viz., in 1316 that the Bass Rock was granted to the Lauders.† To go to the length of invoking the aid of the Pope shows the value which Gannets' grease had in Henry VIII.'s time, a value to which thirty-three years later Hector Boece bears testimony in "The Cosmographe," to be cited immediately.

Sixteenth Century.—3. The first really descriptive story of the Bass Gannets, which has been preserved to us, is to be found in Major's "History of Great Britain." He was born in 1469 at Gleghornie, now spelled Glegharnie—a small hamlet, situated a few miles only from the Bass Rock. This work is entitled :—

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* By George Muirhead, II., p. 37.

† But it was not until some time subsequently that they appropriately assumed a Solan Goose for their crest. *See* M'Crie's History of the Bass; the Bass was sold by the Lauders in 1621.

"Historia Majoris Britanniæ," per Joannem Majorem, 1521.*

"Prope Glegornum in Oceano ad duas leucas est rupes Bassensis, in qua est arx inexpugnabilis circa quam magnarum anatum (quas Sollendas vocant) de piscibus viventium est mira multitudo, quæ cum anatibus ferinis communibus aut domesticis non sunt eadem in specie specialissima : sed quia eis in colore & figura persimiles sunt, nomine communi anatum congaudent, sed discriminis causa sollendæ vocantur. Hæ anates, aut hi anseres, in vere turmatim a meridie ad rupem de Bas quotannis veniunt, & rupem duobus vel tribus diebus circumvolitant, quo in tempore rupem inhabitantes nullum tumultum faciunt : tunc nidificare incipiunt, & tota æstate manent, & piscibus vivunt, & incolæ rupis piscibus ab illis captis pascuntur. Ascendunt namque illarum nidos, & ad libitum pisces capiunt. In capiendis piscibus mirabilis est hujus avis industria. In fundo maris lynceis oculis piscem contemplatur, contra quem se præcipitat, sicut contra ardeam Nisus, quem protinus ore & ungulis extrahit : et si a rupe aliquo alio intervallo distet, alio pisce meliore viso priorem elabi permittit, quatinus posterius visum capiat ; & sic semper recentissimos habent pisces in tota æstate in rupe.

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* Editio nova, Edinburgh, pp. 22-23, by John Major (or Mair, *cf.* "Dict. Nat. Biography," XXXV., p. 386), MDCCXL. In the first edition there are many contractions. Mr. J. E. Harting seems to have been the first to draw attention to this passage ("Handbook of British Birds," new edition, p. 286); neither Professor Fleming nor Professor Cunningham refers to it. The book was lent to me by Mr. H. G. Aldis.

Juniores anates aut anserculos in terra vicina vendunt; si ex his bis vel ter comederis sapidissimæ apparebunt. Aves enim istæ pinguissimæ sunt, earumque pingue artificiose extrahunt, quod in multis medicationibus prodest, & partes macras earum vendunt. In fine autumni rupem triduo circumvolitant & postea agminatim ad partes meridionales pro tota hyeme avolant, ut illic vivant in æstate: quia quando nobis est hyems, meridionalibus est æstas. Diutissime hæ aves vivunt, quod per quasdam insuper signatas incolæ perpenderunt. Triginta aut quadraginta in rupe bellatores harum avium fructus alit, & domino rupis nonnihil vectigalis penditur."

The following translation of Major's narrative is taken with some slight alterations from the "Publications of the Scottish History Society" (Vol. V., p. 34, Constable's edition):—

TRANSLATION.

"Near to Gleghornie,* in the ocean, at a distance of two leagues, is the Bass Rock, wherein is an impregnable stronghold. Round about it is seen a marvellous multitude of great ducks† (which they call Sollends) that live on fish. These fowl are not of the very same species with the common wild duck or with the domestic duck; but inasmuch as they very nearly resemble them in colour and in shape, they share with them the common name, but for the sake of distinction are called solans. These ducks then, or these geese, in the spring of every year return from the south to the rock of the Bass in flocks, and for two or three days, during which the dwellers on the Rock are careful to make no disturbing noise, the birds fly round the rock. They then begin to build their nests, stay there throughout the summer, living upon fish, while the inhabitants of the Rock eat the fish that are caught by them, for the men climb to the nests of the birds, and there get fish to their desire. Marvellous is the skill of this bird in the catching of fish. At the bottom of the sea with lynx-like eye he spies the fish, precipitates himself upon it, as the hawk upon the heron, and then with beak and claw drags it to the surface ; and, if at some distance from the Rock he sees another fish better than the first that has caught his eye, he lets the first escape until he has made sure of the one that was last seen ; and thus on the Rock throughout the summer the freshest fish are always to be had. The ducklings, or goslings, are sold in the neighbouring country. If you will eat of them twice or thrice you will find them very savoury ; for these birds are extremely fat, and the fat skilfully extracted is very serviceable in the preparation of drugs ; and the lean part of the flesh they sell. In the end of autumn the birds fly round about the Rock for the space of three days, and afterward, as in flocks, they take flight to southern parts for the whole winter, that there they may live, as it were, in summer ;

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* Where Major was born.

† Major used "Duck" (*Anas*) as inclusive of Geese (*Anser* and *Bernicla*) or he would hardly have said the Gannet resembled them. Mr. A. H. Evans suggests (*in litt.*) "Waterfowl" as the better equivalent of *Anas*, which it is in the sense that Major applies it.

because, when it is winter with us, it is summer with the people of the south. These birds are very longlived—a fact which the inhabitants have proved by marks upon certain of them. The produce of these birds supports upon the Rock thirty or forty men of the garrison ; and some rent is paid by them to the lord of the Rock."

Major's narrative bears the stamp of truth, and is surely that of an eye-witness, which he may well have been. He was born, as has been said, quite near to the Bass Rock, and his early life before he removed to the university, was probably spent within easy view of its lofty summit. The story of the rejection by the Gannets of a first-caught fish for a better one he may have had from the garrison,—a story which is subsequently repeated, and almost in the same words by Hector Boece, Gesner, Olaus Magnus, Leslie, Aldrovandus and Jonston. All these doubtless copied it from Major, or from one another, but it is a habit which is not confirmed by anything I could learn at the Bass, and may have had its origin in the fact of the Gannet's having the power to retain several fish in its gullet at the same time.

4. Mr. John Anderson informs me that in the Historical Department at the General Register House (Edinburgh) there are, under his charge, a series of "Libri emptorum," giving the daily purchases made for King James IV.'s

table, between September 1st, 1511, and August 6th, 1512, and in these accounts Mr. Anderson finds the four following references to Solan Geese :—

On 11th September, 1511, there was bought for the household (the King being absent at sea) *inter alia* " 1 sollane,"—price defaced;—on 14th September, " ij sollanis ij s "; on 15th September, " ij sollanis ij s " ; on 22nd September, " ij sollanis ij s."

In the Household Books of James V. of Scotland (Proc. Bannatyne Club, LIV., app. 3, 23) there occurs amongst other entries,—such as of moorfowls, partridges, plovers, herons, cranes, dotterel, redshanks, larks, etc.—" ij porcelli ij auce solares* xlvj pultre [chickens] " served on September 4th, 1525, to the King at Edinburgh ; and again we have on August 17th, 1529, the entry " Empt' vj auce solares " which birds were served at Falkland [Palace], a favourite hunting seat in Fife. This is about the date at which the young Gannets would have been ripe for eating, and the editor is no doubt right in translating "auce† solares" Soland Geese (*l.c.*, XIX.). Probably they had been procured from the Bass Rock, which was not far from Edinburgh,—or from Falkland Palace,—to serve as a royal dish. On

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* Perhaps a misreading for " solanes."

† Professor Newton explains that " auce " stands for *Aucæ*, the plural of *Auca*, which he adds was a common mediaeval Latin word for Goose. *See* " Promptorium Parvulorum," Way's Ed$^{n.}$ p. 204. In these Accounts " Auca " is applied to six kinds of birds.

May 23rd, 1497, King James' predecessor, James IV., had also visited the Bass Rock,* where doubtless he must have seen the Gannets, which, as already stated, are alluded to in his "accounts" as having been used for food.†

5. In 1526 Hector Boece (or Boethius), Canon of Aberdeen, gives in his famous "The Cosmographe and Discription of Albion" a capital description of the Bass Rock, where "ar incredible noumer of Soland Geis; nocht unlik to thir fowlis, that Plineus calls See Ernis [Sea Eagles]; and are sene in na part of Albion, bot in this Crag and Ailsay. At thair first cumin quihilk is in the spring of the yeir, thay gadder sa great noumer [gather so great number] of treis and stikkis to big thair nestis, that the samin micht be sufficient fewell to the keparis of the castell, howbeit thay had na uthir provision; and thocht the keparis tak fra thir fowlis thir stikkis and treis, yit thay tak litil indingnation thairof, but bringis haistelie agane als mony fra uthir placis quhair thay fle. Thay nuris thair birdis [nourish their young birds] with maist deligat fische; for thocht thay have, ane fische in thair mouth above the seis, quhair thay fle, yit gif thay se ane uthir bettir, thay lat the first fal and doukis, with ane fellon stoure [duck with a great stoop] in the see,

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* *See* "Accounts of The Lord High Treasurer of Scotland," Vol. I., preface cxlix.

† pref. ccv.

and bringis haistelie up the fische that thay last saw ; and thoucht this fische be reft fra hir be the keparis of the castell, scho takkis litill indingnation, bot fleis incontinent for ane uthir. Thir keparis of the castell forsaid, takis the young geis fra thaim with litill impediment ; thus cumis gret proffet yeirlie to the lord of the said castell. Within the bowellis of thir geis, is ane fatness of singulaire medicine ; for it helis mony infirmeties, speciallie sik as cumis be gut [such as come by gout] and cater [catarrh] disceding [diseasing] in the hanches or lethes [groins] of men and wemen. . . . ."[*]

The preceding is taken from John Bellenden's version of Boece, which was first printed in 1536.[†] On comparing the passage with Harrison's translation in Holinshed's "Chronicle," the latter's rendering is seen to be somewhat more diffuse. Put into modern English Boece's narrative would read as follows :—

"On the Bass Rock there are an incredible number of Solan Geese ; not unlike to those fowls which Pliny calls Sea Eagles ; to be seen in no part of Albion, but on this crag [of Bass] and Ailsa. At their first coming, which is in the spring of the year, they gather so great number of trees* and sticks to build their nests, that the same would be sufficient fuel to the keepers of the castle, if they had no other provision; and though the keepers take from these fowls their sticks and pieces of wood, yet they take little indignation thereat, but bring hastily again as many from other places where they fly. They nourish their young with most delicate fish; for though they have one fish in their mouth above the seas, where they fly, yet if they see another better, they let the first fall, and drop into the sea with a plunge, and bring up hastily the fish that they last saw; and though this fish be taken from her by the keepers of the castle, the Solan Goose takes little indignation, but flies immediately for another. The keepers of the aforesaid castle take the young Geese from them with little impediment: thus comes great profit yearly to the lord of the said castle. Within the bowels of the Geese is a fatness of singular medicin-[al value]; for it heals many infirmities specially such as come by gout and catarrh causing disease in the haunches or groins of men and women."

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[*] For the modern signification of the obsolete words *gut*, *cater* and *ethes*, made use of in this last sentence, I am indebted to Mr. James Hooper, of Norwich, but *cf.* "Notes and Queries" of October 17th, 1903. A correspondent suggests that *lethes* should be *leskes*.

[†] 1821 edition, I., chap. 9, p. xxxvii. Boece's account of the Claik (*i.e.*, Bernicle) Geese is given in chap. 14 of "The Cosmographe."

Boece's has been erroneously considered to be the first account of the Gannets on the Bass, but we have shown that John Major's is earlier, and if the two be compared it becomes a question if Boece has not in part copied from Major, with whom he was contemporary. It is true that Major makes no mention of the use by the inhabitants of the Bass of the sticks fetched up by Gannets, so it is possible that his "Historia Majoris Britanniæ" although it had been published five years, was unknown to Hector Boece. On the other hand, the story of the first fish rejected for a better one is told by them both.

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* Professor Newton remarks that "tree" is the old word, meaning wood or pieces of wood, and is here used in that sense. "Treen" is an obsolete adjective which meant wooden.

6. Peter Swave, a Dane, visited Scotland in 1535, and in a curious diary written in Latin, and contained in the third volume of State Papers from the Archives of Copenhagen ("Aars beretninger fra det Kongeliger Geheimearchiv," III., pp. 232 *et seq.*[*]) he says :—"Quinto die a discessu Angliam in conspectu habuimus, septimo Scotiæ littora intrauimus. Vidimus in mari iacentem arcem Basth in uasta rupe sitam. Ibi sunt aves, quos Scoti gant uocant, albi, sed admixto colore nigro, tanta multitudine, ut numerus non facile reperiatur. Ex plumis et piscibus, quos adferunt aves ad rupem, dictur præfectus quotannis colligere posse ad quadringentos aureos . . . . auem gandt non nisi unum ouum edere, idipsum stando sub pede ponere et excludere."

TRANSLATION.

" . . . . We saw a fortified place, called Basth,[†] situated on an immense rock. There are found birds which the Scots call gannets, of white colour, but mixed with black, and in such multitudes that they could not be easily estimated. From the feathers and fishes which these birds carry on to the rock the commander of the fort is said to be able to collect an annual sum amounting to 400 gold pieces . . . . . . The bird called the Gannet lays no more than one egg, and hatches it under its foot in a standing position."

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[*] Edited by C. F. Wegener, 1861-65.

[†] The Rev. H. N. Bonar observes that "Bathais" in Gaelic means a forehead or front, and is pronounced as a monosyllable, the th being mute.

This translation is taken from "Early travellers in Scotland," 1891, by Hume Brown, who used a copy of the State papers in the possession of Sheriff Mackay. This seems to be the first time that the Anglo-Saxon name of Gannet is applied to the occupants of the Bass, or Basth, as Swave terms it, though the word had been employed at a much earlier period in connection with Lundy Island. Here also we first hear a money value given to the Gannets' produce, a value which is next spoken to, though no amount is named, by Bishop Leslie, in 1578.

7. Dr. William Turner, author of the "Avium præcipuarum, quarum apud Plinium et Aristotelem mentio est, brevis & succincta historia," * after describing the Bernicle, writes thus of the Gannet :—

TRANSLATION.

"The second Goose, of which I promised I would speak,

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* *Coloniæ* [Cologne] 1544.

is a sea-bird, which lives by hunting fishes, somewhat less in size than the Goose given above [the Bernicle Goose]; and yet in voice and aspect it recalls the Goose in every way; it nests within the Scottish sea, upon the lofty cliffs of the Bass Isle—so called, as I opine, by an antiphrasis—and nowhere else in all Britain. This bird looks to its young with so much loving care that it will fight most gallantly with lads that are let down in baskets by a rope to carry them away, not without danger of life. Nor must we fail to mention that a salve, most valuable for many a disease, is made by Scots from the fat of this Goose (for it is wonderfully full of fat) which may deservedly rival the Commogenum [ointment] vaunted much by Pliny, in its virtue and the number of its cures."

Turner may have derived his knowledge about the fat of the Gannet from Major, but he must have heard from some independent source of the boys being let down in baskets. Mr. A. H. Evans, from whose excellent modern edition (1903) of his work the above translation is taken, considers that every page of Turner's treatise bears witness to a personal knowledge of ornithology,* but it is not likely that Turner had been to the Bass.

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* "Turner on Birds," edited and translated by A. H. Evans, p. ix. By an antiphrasis of the name Bass, Mr. Evans thinks Turner meant that it was as if the derivation was from the French *bas* = low, in contradistinction to the lofty cliffs.

8. In 1548 Jeane de Beaugué, accompanied the Sieur d'Essé on a military expedition to Scotland, and from his "Histoire de la Guerre d'Ecosse pendant les campagnes 1548 et 1549" Mr. Hume Brown has translated some interesting passages in his recent work entitled "Early Travellers in Scotland."* In one of these there is the following allusion to the Gannets on the Bass:—"The place where they made their first attempt [to land] was the Isle des Magots [Bass Rock], so called on account of the large white birds like swans that make their nests there. The Scots receive it as a fact that the hundred and twenty soldiers who form the ordinary garrison of the Castle of Bass, which is built on the island, live for the most part on nothing else than the fish daily carried thither by these birds; and burn no other wood than what these wild geese bring in spring to build their nests with, this being sufficient to last them for a whole year." It has been suggested that the French sailors called the Bass an "Isle des Magots" because it was inaccessible to any but "magots," *i.e.*, monkeys, but "Margot" is the common name for the Gannet on the north coast of France, where I have heard fishermen use it, besides de Beaugué offers that explanation, so there is no need to seek further for the meaning of it.

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* Edinburgh, 1891.

9. The next author in order of date who alludes to the birds on the Bass is Conrad Gesner, who in his "Historia Animalium," *liber*. III., p. 158 (1555), is the first to figure the Gannet.* It is not necessary to give the original in the Latin.† After first quoting from William Turner, with whom as Professor Newton has pointed out, Gesner had a personal acquaintance, he continues :—

TRANSLATION.

"I lately received from a learned Scot [some of] those Geese called Solandgeese which are longer than tame ones but not so broad : they lay their eggs on rocks : and with one foot placed upon them (whence perchance the name from *solea*, that is, the sole of the foot, and the Germans also so name them) at length hatch them. Plenty of them are taken at the island Bass near the river Forth, which flows by Edinburgh in Scotland : nor are they found anywhere else. They go far, even six miles from the shore. It is their nature that when they see a fresh fish they throw up a former one [which they have taken], and this they do very often, and carry the last to their young. Moreover, so many fishes do they throw up that those who form the garrison of the fortress collect the ejected fishes for food.

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* *See* p. 29.

† I learn from Mr. W. H. Mullens that the Gannet is also included and figured in Gesner's "Icones Avium Omnium," with the legend "Anser Bassanus vel Scoticus, avis marina."

They [the birds] are easily taken, nor do they drive away their captors."

The rest of Gesner's account is borrowed from Hector Boethius. Peter Swave and Gesner are the first authors to make mention of the Gannet's placing its foot upon its egg, a strange departure from the usual habit which obtains among birds. The knowledge of this fact he evidently derived "ex erudito homine Scoto," who, Professor Newton considered, was the St. Clare whose liberality is acknowledged at the head of Gesner's article. It is curious that he should have thought that Gannets only went six miles away from land. With John Major's "History" Gesner was probably unacquainted.

10. Olaus Magnus. "Historia de gentibus septentrionalibus." Lib. XIX., *de avibus*, cap. 9 (1555). As Olaus Magnus' account is taken almost word for word from John Major it is unnecessary to occupy space by quoting it. Mr. Mullens informs me that the same is repeated in Olaus Magnus's "History of the Goths, Svvedes, and Vandals." (Translation.) 1658, p. 198.

11. The next author to be cited is Dr. Caius: "De rariorum animalium," some extracts from which are reprinted with a translation in the appendix to Mr. Evans's edition of Turner.* Its full title is :—"Joannis Caii Britanni

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* (1903) p. 195, appendix.

de rariorum animalium atq : stirpium historia," liber unus, 1570. I need not give the Latin.

TRANSLATION.

"Of the Brent Goose.* . . . . It [*i.e.*, the Brent] is not, therefore, the Bass Goose of the Scots, which has its nest and eggs on the Bass, a Scottish Isle, and thence takes its name. Now, when at a certain season of the year the Geese are about to return to this precipitous island rock—not so big on the top as a Kite could hover over (as the poet has said), but very small—it would be too long to recount what spying, what circumspection (scouts having been sent ahead) they use before they alight ; at what time of year they do this, the solitary state of the isle, when the inhabitants shut themselves up for several days, until the Geese have settled down, lest they should drive them off, in what numbers and in what a throng they fly to it, so that in clear weather they obscure the sun, how many fishes they bring home, how many eggs they lay, and what profit the dwellers on the isle make annually from the feathers and the oil of these Geese (for they possess the fatness and the taste of Pupins)."

Caius' account appears to have been adapted from the authors already quoted, as he refers to nothing which they have not mentioned, except it be where he compares Gannets to Puffins in respect of their fatness. Like Turner, he commences by a somewhat needless comparison between the Bernicle Goose and the Gannet, but there were other authors in whose minds there was some confusion between these two birds.*

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* The "Brent Goose" of Caius is what is now called a Bernicle Goose.

12. The next testimony is that of Bishop Leslie's "De origine, moribus, et rebus gestis Scotorum,"† already referred to under Ailsa Craig (p. 78). John Leslie or Lesley was Bishop of Ross, and died in 1596, in which year James Dalrymple's translation of the "De origine," which is here quoted from, was made.‡

TRANSLATION.

"The Water of fforth is ane arme of the Sea, and a place quhairwnto the sey flowis and ebbis, it rinis by Lawdien, and diuides the North frome Laudien, in quhilke is a gret and infinit multitude of Diuerse kyndes of fishe, quhair lykwyse excepte thir fishe, may be seine ane foul, at othir tymes thoch maist rair, zit in this ane place maist frequent, for quhen in the Sey selfe ar mony Iles and Inches nocht few, as the Mai, the Basse, the ile of S. Colme, quhair is a monaster of the same name, nocht obscure, Inchkeith and vthiris : this foul of whome we speike, only bigis in the Basse, nathir in ony place with ws is funde excepte in Elissa [or Elza*] a craig in the sey foranent Galloway. ffarther sche is a Sey guse, as we use to speik, or that foul, rather, quhilke Plinius calles ane Picarine, commonlie now ane solande guse. In the Basse thay abund maist, in Elissa nocht sa mekle. This guse zeirlie in the spring tyme returnes to ws : quhairfra can na man tell : bot southwardlie. at her first flicht, quhen sche makes first residence sche flies twa dayes still and continuallie round about the craig : all this tyme settis na man his heid out of the hous : Than bringis sche in a short space sa mony stickis, as will serue baith to her biging, and to be fyre to that hail familie perchance the number of XL. persounes (In that craig is sa stark ane castell that nane strenthier) the space of ane zeir ze and langer. In the beginning fleidlie and with gret feir thay to cum are seine, bot how sone thay begin to bigg thair nestis, the grettest gun that is schott will nocht scar thame, nor chais thame away ; thay lay thair egs : Thay feid thair birdis diligentlie, with the maist diligate fishe that thay find, quhilkes with a gret force thay bring frome the sey

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* *viz.*, Butler, in the political satire of "Hudibras," 1663; O'Flaherty, "Description of Connaught," 1684; and Leigh, "Natural History of Lancashire," 1703.

† Roma, 1578. 2nd edition, 1675, p. 15.

‡ "The Historie of Scotland, wrythen first in Latin by Jhone Leslie, and translated in Scottish by Father James Dalrymple." Mr. Quinton informs me that it was printed by the Scottish Text Society, 1884-91, under the editorship of Father E. G. Cody, from the Dalrymple MS. It does not appear to be very literal.

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* This is not in the original.

ground, when thay dowk violentlie. for thay delyte in this labour, and in sa gret labour, and thay ar sa snell and suift of flicht that be the seymen and marinelis sumtymes, thay ar fund two myles and oft tymes mair frome the craig seiking thair pray. Mairatouer, thay are sa greidie that gif thay sie ony fishe mair diligate neir the craig, the pray quhilke perauentur, thay brocht far aff, with speid thay wap out of thair mouth, and violentlie wil now that pray invade, and quhen thay haue takne it will bring it to thair birdes : Gif thay sie, as oft chances, men tak this fishe fra thair birdes, thay tyre nocht, with speid to flie to the fowlling agane ; and agane and agane, how oft thay ar spoyled, ay quhill the sone gang to ; that thay can nocht langre sie. finalie of thir cumis zeirlie to the capitane of the castell na smal, bot ane verie large rent ; for nocht only baith to himselfe and to vtheris obteines he sticks, fische, ze, and the fowlis selfes, quhilkes because thay haue a diligate taste, in gret number ar sent to the nerrest tounes to be salde, bot lykwyse of thair fethiris, and fatt quhilkes gyue a gret price, he gathiris mekle money: of thame this is the commone opinione, that by vthiris vses thay serue to, thay ar a present remeid against the gutt, and vtheris dolouris of the bodie. farther sa gret a number is thair of thame that gif in a schip, tymlie in the morning ze passe by the craig, quhill thay zit ar thair, the hail craig

bowing doune, quhilke indeed, naturallie is black, ze wil think aluttirlie quhyte. In compase it conteines fyve stages and ane in hichte. To this fowle the sey is sa natural that gif throuch a tempest, or any vthir chance sche lycht on the ground, quhair the sey sche sies nocht, as sche war destitute of benefite of her wings, sche can no rais her selfe."

The same friend who supplied me with the preceding extract, Professor Newton, also kindly rendered Leslie's Latin from the original, at the same time putting it into much more literal and intelligible English :—

"The Forth estuary washes Lothian. In it, beside a huge and infinitely varied multitude of fishes, you may also see a bird elsewhere most rare which is there very abundant, though in one place only. For though in this firth there are not a few islands : May, Bass, Horse's Isle [Inchkeith ?] St. Columba's Isle [Inch Colm] (on which there is a not obscure monastery* of the same name), Gervea, [Inch Garvie]. and others : that bird of which we treat builds its nest on the Bass alone, nor is it found anywhere else with us except on Ailsa Craig in the Vergine [*i.e.*, Irish] Sea† off Galloway. But it is a marine goose, as we say, or that Eagle which Pliny calls Picarina,* but in common speech the Soland Goose. In the former of these places [*i.e.*, the Bass] they very much abound, but in the latter [Ailsa] are found in fewer numbers. Every year at the beginning of spring it returns to us, from what part of the world except the south, no one knows, and for two days in succession, on its first arrival, keeps up an almost continuous flight round and round the rock; at which time no one goes out of the house. Soon after it brings sticks, enough both for its own nests and sufficient for the whole company of perhaps forty men† (the castle on the rock itself is very well supplied) for the coming year. At first they approach timidly, but so soon as they shall have begun to build their nests they are not even frightened by the loudest sounds of cannon shots.‡ They lay, and hatch their eggs. They feed their young most attentively with certain of the more delicate fishes which they take from the sea, plunging into its depth with great force. They take such delight in this work, and are of such swift flight, that they are sometimes caught by sailors intent on fowling two hundred miles* or more from the rock. In addition to this, so great is their greediness that should they see near the rock a more delicate fish than that which they may be bringing from afar, dropping their prey, they attack the former with great force, and when caught bear it to their young, and if they should see it (as often happens) taken away from their young by men, they will supply fresh food again and again, with unwearied labour until, after sunset, they are hindered by darkness. Lastly the captain of the fort derives ample provision from them yearly for himself and others, not only sticks and fishes, and the young birds themselves (which, since they possess a delicate flavour, are sent for sale to the neighbouring towns), but he also gets much money from the bird's feathers, and their fat which is of great value, for its use is believed to be a present remedy against gout and other diseases of the body. So great is the number of these birds, that when they are upon the rock just before dawn, and you should go across to them in ship, you would think that the whole rock was manifestly white, though by its cliff it is naturally black. It measures about five furlongs in circumference, and is about one in height. The sea is so natural to this bird, that if through storm or other mishap it should alight on land where it cannot see the sea, it is unable to rise again, as though bereft of the use of its wings."

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* Of which Bower, to whom we owe the first mention of Bass Gannets, was abbot, *see* p. 171.

† *Vergivium mare*, Ptol = the sea between England and Ireland.

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* A comparison already suggested by Boece.

† De Beaugué says a hundred and twenty men, *see* p. 184.

‡ The cannon of those days must have been very small. I can testify to the alarming effect produced by a cannon now if fired from a steamer under their breeding cliffs, many hundreds of Gannets and other birds immediately taking wing and in some cases in their haste knock their eggs into the sea.

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* As pointed out by Mr. Southwell the "hundred" is omitted in Father Dalrymple's free translation, which reads "two myles and oft tymes mair"; probably Dalrymple thought that such a distance as two hundred miles was too incredible to be true. Gesner (*t.c.*) said they went six miles, and thought that was very far.

Though not himself an eye-witness, it is evidently from one acquainted with the Bass Rock, that Leslie's narrative is, in part at least, derived.

13. The Rev. Thomas M'Crie, in his "Bass Rock: Its Civil and Ecclesiastical History," before referred to, gives (p. 43) a long Ratification by Parliament* in 1592 of the rights of the then owner of the Bass to all the Solan Geese and other fowls frequenting the island, and forbidding under penalties "all skeppairs and marinars of schipps or boittes and every personis quhatsumevir . . . . To slay and destroy the saidis Solane geiss, be casting off neittis & hykis [hooks] with bait and burris [hair or snares ? †]. To draw and allure the auld solane geiss to the baittis quhairin the saidis personis and marinaris ar, and then to take and slay the saidis solane geiss, for na uther benefite or comoditie of thame bot for thair fedderis [feathers] onlie ; ffor the saidis solane geiss quhen thai depairt fra the said ile as they do continwally anys in the zeir [once in the year] are auld

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* Acts Jac. VI. Ed. 1814, p. 614. (Reign of Elizabeth.)

† "burris," probably from the French bourre = cow's hair (Jamieson).

and leyne, unhable to any man's meitt, as alsua quhen they returne anys in the zeir, hame agane to the Ile are unhable to the nurischement of ony persoun."

That such a specification of private rights should have been necessary is a further testimony to the value of the Gannets.

14. U. Aldrovandi Ornithologiæ, Tom. tertius. Lib. XIX., p. 162 (1599–1603). Chapter xx. is here devoted to "The Bass or Scottish Goose," but the account of it is all copied from Boece and Gesner; the figure which was never intended for a Gannet, though so ascribed by Jonston, has already been commented on.*

Seventeenth Century.—15. Having now done with the sixteenth century writers, we come to John Taylor, the poet,† who in 1618 found himself stopping at Adam, or Auldhame, a hamlet not far from the Bass Rock, where it appears from this entry in his journal that his entertainment was to his satisfaction:—"Amongst our viands that wee had there, I must not forget the Sole and Goose, a most delicate fowl, which breeds in great aboundance in a little rocke called the Basse, which stands two miles into the sea. . . . The Lord or owner of the Basse doth profit at the least two hundred pound yeerely by those geese." The poet's peculiar way of writing Solan was presumably a joke on his part.

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* *See* p. 32.

† "Works of John Taylor, the water-poet," Hindley's Edition, 1872, p. 60.

16. "Britannia," by William Camden. Translation by Philemon Holland. (1610.)

Holland, the editor of this edition of the "Britannia," in speaking of the Bass Rock, has some observations which are perhaps original :—"What a multitude of sea foules, and especially of those geese which they call scoutes and soland geese flocke hither at their times, for, by report, their number is such that in a cleere day they take away the sunnes light ; what a sort of fishes they bring, for, as the speech goeth, a hundred garison souldiours* that here lay for the defence of the place fed upon no other meat but the fresh fish that they brought in ; . . . ."

17. In the Household Books of Lord William Howard of Naworth†, one of the border castles of Cumberland, distant from the Bass Rock about sixty miles, we find among other "Rewards" (*i.e.*, payments) for provisions, under date of August 14th, 1624 :—"To the Lord Crainston's man bringing iiij Solamosse‡ geese iijs. iiijd." And again on August 23rd, 1633 :—"To 2 boyes bringinge 10 sollemgeese from my Lord Cranston, xs."

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* De Beaugué says a hundred and twenty, *see* p. 184.

† *See* "Surtees Society," LXVIII., p. 214.

‡ This spelling may be a mis-reading, Professor Skeat is tolerably sure that there is no such suffix as "osse" in any English of any date.

18. "Travels in Holland, the United Provinces, England, Scotland, and Ireland," MDCXXXIV.—MDCXXXV. By Sir William Brereton, Bart. Edited by Edward Hawkins.

Brereton's account of Ailsa Craig has already been given,* but there is more which he has to tell us about the Bass Rock in his journal.

"26 Junii [1635].—Upon Friday we departed from Barwicke. . . . . We came from Barwicke about seven o'clock and came to Dunbair about twelve. . . . . Six miles hence in the sea (though it be a far shorter cut by land) is the island of Bass, which is here very conspicuous ; a mighty high rock placed in the sea, whereinto there is only one passage, and that for a single person. This is now fortified, and inhabited by the lord of the Bass. It is about one English mile [from the shore]. Herein are kept sheep and some kine and coneys ; abundance of fowl breed here, solem-geese, storts, scoutes, and twenty several sorts of fowl, which make such a noise as that you may hear them and nothing else a mile before you come to them. These solem-geese (as it is reported of them), when their eggs are sufficiently sitten, they stamp upon them with their feet, and break them ; they breed in the sides of the rocks, and there is fowl (said to be) sold here, taken in this island, worth £200 per annum.* Here is excellent fresh water in this isle, a dainty pure spring which is to be the more admired. The isle of May is not hence above three leagues, and it is easy to be discerned, wherein also abundance of fowl breed."

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* *See* p. 79.

Brereton does not seem to have landed on the Bass, but only to have viewed it from the mainland. Professor Newton suggests that the "storts" here mentioned were Shags, of which a few breed on the Bass at the present day, and that the "scoutes" were Guillemots, names which Brereton would have obtained at Dunbar.

19. William Harvey, the celebrated discoverer of the circulation of the blood, has a foremost place among the historians of the Bass, for in the "Exercitationes de Generatione Animalium" (1651)—said to have been the last of his works—he gives a somewhat lengthy account of the Bass Rock, from a personal visit to it in 1641, when he accompanied Charles I. to Scotland, but it may be that he only sailed round it without being able to land. He says:—

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* Mr. C. J. Romanes informs me that in the beginning of the seventeenth century the pound Scots was worth about one-twelfth of an English pound, but Mr. Hume Brown thinks there can be no doubt that Brereton is referring to English money. On the other hand the prices previously quoted from the Household Books of James IV. and James V. (*see* p. 177) are in Scotch money. Mr. J. Anderson says that in their reigns—1488-1542—Scots money was to English not 1 to 12, but 1 to 4: thus twenty shillings Scots was equal to five shillings English.

TRANSLATION.

"There is a small island which the Scots call the Bass Island. . . . . The surface of this island, in the months of May and June is almost entirely covered with nests, eggs, and young; so that it is almost impossible, on account of their abundance not to step on them: so great is the crowd of birds on the wing, that, like a cloud they darken the sun and the sky; and such is the noise of their screaming that you can scarcely hear those near who are speaking to you. . . . .

"If you list to sail about the Island, and from below look up the Cliffs as it were overhanging your head, you might see on all the shelves and ledges of the Rocks and Craggy Cliffs innumerable rows of birds of all sorts and magnitudes, more in number than the Stars that appear in a clear and Moonless night. If you look at them that are coming to the Island, or flying away at a distance, you would take them to be huge swarms of Bees you have before you. I should scarcely be credited did I name the revenue which was annually derived from the feathers, the eggs, and the old nests, which as useful for firing, are all made objects of traffic by the proprietor: the sum he mentioned to me exceeds credibility. There was this particular feature which, as it refers to our subject I shall mention, and also as it bears me out in my report of the multitudes of sea-fowl:

the whole island appears of a brilliant white colour to those who approach it—all the cliffs look as if they consisted of the whitest chalk ; the true colour of the rock, however, is dusky and black. It is a friable white crust that is spread over all, which gives the island its whiteness and splendour, a crust having the same consistency, colour, and nature as an eggshell, which plasters everything with a hard, though friable and testaceous kind of covering. The lower part of the rock, laved by the ebbing and flowing tide, preserves its native colour, and clearly shows that the whiteness of the superior parts is due to the liquid excrements of the birds, ... Among the many different kinds of birds which seek the Bass island for the sake of laying and incubating their eggs, and which have such variety of nests, one bird was pointed out to me* which lays but one egg, and this it places upon the point of a rock, with nothing like a nest or bed beneath it, yet so firmly that the mother can go and return without injury to it ; but if anyone move it from its place, by no art can it be fixed or balanced again ; left at liberty it straightway rolls off and falls into the sea. The place as I have said is crusted over with a white cement, and the egg when laid, is bedewed with a thick and viscid moisture, which setting speedily, the egg is soldered as it were, or agglutinated to the subjacent rock."

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* Mr. Bonar thinks this was the Guillemot, and that the fable about its adhering capacity has reference to the manner in which its pyriform egg often rolls about on a ledge, and yet almost in a circle so that it does not fall, but Blaeu who tells the same story attributes it to the Gannet (p. 213).

The words "one bird was pointed out to me" show that Harvey, if he did not set foot on the Bass, at any rate sailed round it, and therefore his testimony is the more noteworthy when he speaks of its surface (by which he must mean the grass-covered top) being almost entirely covered with nests, presumedly of Gannets, but he does not mention the Gannet.

20. "Historia Naturalis de Avibus," by Dr. John Jonston (1650); 1st ed., p. 131.

It is hardly necessary to give Jonston's account of the Bass, as it is avowedly copied from Boece and Gesner. One additional item alone Jonston gives us, viz., that he found the flesh of the Gannet hard and requiring wine, which he could state from personal experience of it during a visit to Scotland in 1623. In a later work by Jonston on the "Things of Nature" his translator adds, "when I was in Scotland I smelt of them and they smelt like herrings!"*

21. "Musæum Tradescantianum: or, A Collection of

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* "A History of the Wonderful Things of Nature," 1657; for the reference and extract I am indebted to Mr. Mullens.

Rarities preserved at *South Lambeth*," MDCLVI. In this catalogue of Tradescant's Museum we find the following entry (p. 4) :—

"Barnacles, four sorts.

"Solon Goose.

"Squeede from the Basse in *Scotland*."

Professor Newton has suggested that the word "squeede" here means a young Gannet dried ("Rept. Museums Association," 1891, p. 32). The word is made use of again in Merrett's "Pinax Rerum Naturalium Britannicarum," (1667), where he says: "Anseris speciem vidi in Cimelio Tradescanti sub nomine squeed una cum Ovo ex Insula Scotica Bass dicta" (p. 179). Mr. W. H. Mullens thinks that the Eider Duck is intended.* It can hardly be the Gannet in this passage which is mentioned by Merrett a few lines lower down. Mr. Evans suggests the Guillemot which has been called a "Queet" in Kincardine.

22. "Britannia Baconia: or, The Natural Rarities of England, Scotland and Wales," by J. Childrey (1661), p. 175.

As Childrey's account of the Gannet is evidently taken from the authors who have been already quoted (Turner and Harvey chiefly) it is unnecessary to repeat it.

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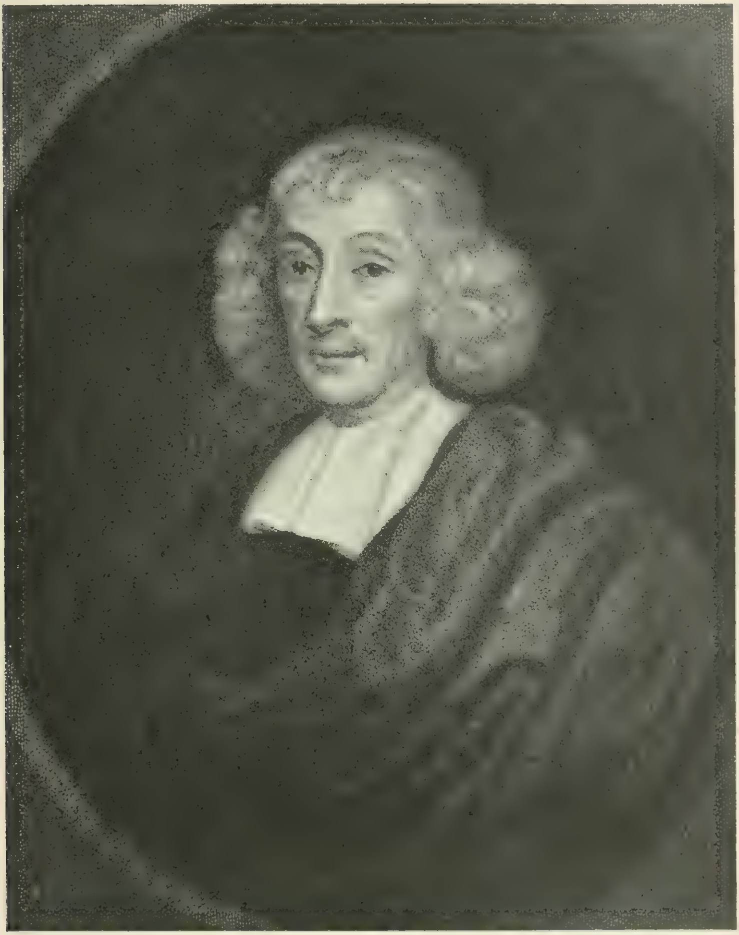
* "British Birds" (Mag.), 1908, p. 158.



JOHN RAY.

(From the Engraving by H. Meyer, after a Picture in the British Museum.)

(From "British Birds" (Mag.), Vol. II., p. 295.)

23. "The [3] Itineraries of John Ray," 1658–1662.*

The next testimony is that of John Ray, whose companions on this his journey to the north were Francis Willughby and Philip Skippon.† In the diary of his second Itinerary, which is somewhat tantalising in its brevity, he says:—

"August 19th [1661] we went [from Dunbar on the coast of Haddingtonshire] to Leith, keeping all along on the side of the Fryth. By the way we viewed Tontallon Castle,‡ and passed over to the Basse Island, where we saw on the rocks innumerable of the soland geese. The old ones are all over white, excepting the pinion, or hard feathers, of their wings, which are black. The upper part of the head and neck in those that are old is of a yellowish dun colour; they lay but one egg apiece, which is white, and not very large. They are very bold, and sit in great multitudes till one comes close up to them, because they are not wont to be scared or disturbed. The young ones are esteemed a choice dish in Scotland, and sold very dear (1s. 8d. plucked). We eat of them at Dunbar [where Ray had been staying the day before]. They are in bigness little inferior to an ordinary goose. The young one is upon the back black, and speckled with little white spots, under the breast and the belly grey. The beak is sharp-pointed, the mouth very wide and large, the tongue very small, the eyes great, the foot hath four toes webbed together. It feeds upon mackrel and herring, and the flesh of the young one smells and tastes strong of these fish. The other birds which nestle in the Basse are these: the scout [Razorbill*], which is double ribbed; the cattiwake [Kittiwake Gull], in English, cormorant, the scart [Shag], and a bird called the turtle-dove, whole-footed, and the feet red [Black Guillemot]. There are verses which contain the names of these birds among the vulgar, two whereof are :—

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* Printed in the "Memorials of John Ray," edited by Dr. E. Lankester in 1846 (p. 154). These three itineraries were first printed by Scott in 1760, and with this edition Dr. Lankester's has been compared. Lankester does not seem to have seen the original MS., which is not at the British Museum, nor with Ray's letters at the Natural History Museum, *cf.* "Notes and Queries," June 11th, 1904. Professor Newton suspected one or two misreadings in it. The accompanying portrait of John Ray is with the permission of the editors of "British Birds," borrowed from a valuable article on the life of this worthy by Mr. W. H. Mullens (1909, p. 290).

† Afterwards Sir Philip Skippon.

‡ A stronghold of the Douglases which still stands on the cliff, but has suffered much. An abortive attempt was made by James V. to "ding doon Tontallon."

> "The scout, the scart, the cattiwake,
> The Soland goose sits on the lack,†
> Yearly in the spring."

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* The name "Scout" has been usually applied to the Guillemot, but it was not so applied by Ray, either here, or on his visit in July, 1671, to Bamborough Castle, where he writes of "Scouts or Razorbills," but he also mentions "Guillemets," which he does not do at the Bass. *See* also what he says in the "Ornithology" (Eng. ed.), pp. 19, 324.

† *Lack or Lacks* is a local name for the rocks at low tide as I ascertained from one of the natives.

"We saw of the scouts' eggs, which are very large and speckled. It is very dangerous to climb the rocks for the young of these fowls, and seldom a year passeth but one or other of the climbers fall down and lose their lives, as did one not long before our being there. The laird of this island [the Earl of Lauderdale] makes a great profit yearly of the soland geese taken; as I remember, they told us 130*l.* sterling.* There is in the isle a small house, which they call a castle; . . . . . "

The narrative of the journey of these two pioneers of ornithology, and one or two friends—most of it, perhaps, made on horseback†—brings the past back vividly. One can imagine them following the coast road from Dunbar, probably where it goes now, their halt at Tantallon Castle, which had been partially battered down twenty-two years before, and their rapture over the Bass as their horses draw near to Canty Bay. Francis Willughby was twenty-six and John Ray thirty-three, but their youth only makes the accuracy of their observations the more meritorious. Willughby only survived this memorable journey by eleven years, dying in 1672, having published little beyond a few papers in the Philosophical Transactions. The "Ornithology" at which he had so greatly laboured, and which the loyal zeal and friendship of an attached companionship prompted John Ray to complete after his death, was published in 1676, and amongst those who contributed pictures of birds is mentioned his quondam fellow-traveller, Sir Philip Skippon. Ray, says Dr. Derham, has left in the preface a beautiful memorial of the estimation in which he held his friend, in the summary there given of Willughby's character. The influence of Willughby has been very great in ornithology, but that it has been so, is in a great measure thanks to Ray; there is something remarkable, as well as very touching, in the union of these two men. There is little left which connects them with the place now, at the same time there is nothing preposterous in the supposition that there may be Gannets living on the Bass Rock now which were there in Ray's time, for we know nothing of the ages which birds attain to.

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* English money, as "sterling" is added; Ray alludes to Scotch money further on (*t.c.*, p. 161).

† That they started on horseback is clear, for at Peterborough the cathedral choristers made them pay money for coming into the choir with their spurs on.

24. "Geographiæ Blavianæ Volumen sextum," quo Liber XII., XIII., Europæ continentvr. Labore Johannis Blaeu. Amsterdam (1662). Folio.

To the late Professor Newton I am indebted for making and translating the following extracts from Blaeu's great geographical work. Blaeu's sumptuous folio was published by his sons in Latin, but not until long after his death, which took place in 1638. The original edition is doubtless very rare, the copy in the Cambridge University Library, made use of by Professor Newton, being, Mr. Robert Gladstone tells me, the last but one of the Latin editions. By the kindness of Mr. H. Gladstone, Professor Newton's translations have been collated with some which were more recently made for Mr. Gladstone from a Dutch edition of the "Geographiæ" published in 1654, but I have here adhered to the original.

TRANSLATION OF THE FIRST PASSAGE.*

(Page 40.) "At the beginning of autumn so great is the take of herrings for some weeks near Dunbar that not only are the poor people of the neighbourhood fed upon them, but pickled in salt they are kept for the use of the rich against the following seasons of the year. Besides this, by a special favour of providence, at a certain time of year sea-fowls like Geese, and hence commonly called Geese, fly hither to us from the outer world and take up their abode on a rock in the Firth of Forth, named the Bass, where they lay their eggs, and when laid brood them the appointed time, and hatch them. No where else in the whole of Europe will you find Geese of this kind except on a high rock to the westward in the Firth of Clyde [Ailsa Craig]. So great is the number of them here that the laird of the place makes no small profit out of them, for not only is the flesh of these birds fit to eat, but their feathers serve to stuff beds. Wonderful things are told by our historians of these birds, which come to us about the middle of April and depart about the middle of September. But before the arrival of the main body they send on some as though scouts and commissioners to spy out and mark the abodes. The Goose lays only one egg at a time, which it places on end on the rock with so much skill, and fosters it there placed with its foot, never or seldom leaving go, until the chick is hatched, for should it happen to that Goose to take its foot off the egg and leave it, or that it be moved from its place by a man, it is impossible by any means so to replace it on the rock that it shall remain fixed,* in which case the Goose lays another egg in place of the lost one, and sets it in the position of the former. It is peculiar to these Geese that they cannot fly by any means unless they see the sea. This has become known to men, when sometimes carried away by a blast of wind from the rock to the mainland out of sight of the sea, they perceive that they are to be caught, endeavouring to escape by flight from the hands of those taking them, they show themselves plainly unable to fly. When the young reach the size of tame Geese they are sweet and fit to eat, but hardly sooner. The flesh of the old Geese is hard, lean, and black, though their feathers are white. When they come to the Bass they bring with them a great quantity of fishes upon which they live, which sometimes afford spoil to the men who abide there, and serve as food for them. They likewise carry with them sticks, of which they build nests, and these also the inhabitants of the rock take and use for firing. These Geese are commonly called Solen, mispronounced Solend, corrupted as I think from the Latin*—that is of yearly occurrence—for they come to us solely once at a single term in the whole year. By some they are called *Scoutis*,† that is ὧταισται [listeners], from their exquisite faculty of hearing, in which writers on natural history tell that Geese excel every other kind. But I rather believe the Scoutis are those Geese which are sent on in advance, as above said."

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* Mr. Robert Gladstone, to whose assistance I am greatly indebted, informs me that this first passage is by Sir John Scott.

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* In his "Tour through Great Britain" (1722), Daniel Defoe is at some pains to recount this fable, which he probably took from William Harvey, who also relates it, though of what species is not clear,—or from Blaeu, but Defoe says he went to the Bass.

The second passage in Blaeu relating to the Gannet which gives some additional particulars, is in the account of Islands in the Firth of Forth (p. 90), and was also translated for me by Professor Newton. This section is entitled: "Nova / Fifæ / Descriptio auctore Roberto Gordonio . . . . Insula Bas."

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* This is a misapprehension, *see* p. 24.

† Ray uses "Scout" as a name for the Razorbill, and others apply it to the Guillemot. My experience of Gannets, chiefly derived from some in confinement, is that they are very deaf birds.

TRANSLATION OF THE SECOND PASSAGE.

"At the very top [of the Bass Rock] there is a small chapel, and a very clear spring of water.* It hardly feeds twenty sheep. In winter time they have no coals, but often use the birds' nests for their hearths. Besides the birds which we shall [presently] say that the Isle of May † produces, it [the Bass] has one altogether marvellous. It is commonly called the Bass Goose, and is somewhat smaller than Common Geese, but much fatter. It lives on herrings, and when it is eaten retains their flavour. In fatness it excels by far all birds of what kind soever. In the month of April or May these Geese make for this island, and then every thing must be quiet ; but when they have begun to build their nests, they fear no noise. Their feathers are useful for filling beds. They are sold by the people of the neighbourhood dear enough. Those of Edinburgh pay 25 shillings for one Goose. Each has but one egg, and that but once a year. This they place with so much skill, that if anyone hanging by a rope, removes it from the rock, it cannot be again replaced. They do not sit upon the egg like other birds, but lay the sole of their foot upon it, and thus brood and hatch the chick. The young are somewhat ash-coloured, but the adults are white. They have a long neck after the fashion of a Crane's, a very sharp bill of the length of the middle finger, and of a yellow colour. The bone which we commonly call *the Bril* [*i.e.*, pair of spectacles] can in other birds be separated from the breastbone, but in this by no means, so that it cannot be torn away by any force, being so fixed to the latter, that [the bird] plunging into the sea when it pursues herrings may not break its neck by its own violence. In the month of August the young are taken away and sold for quite a high price, the others fly away until the following year. Many, however, are killed by them [the people] in this manner; seamen smooth and whiten a plank and tie herrings to it, which plank they lash to the stern of the boat. When the Geese see this and try to seize [the herrings] with their bill, they dash their bill so strongly into the plank that they are unable to pull it out, but are caught, or rather catch themselves. Further if these Geese fly so far from the sea that they can not see the water, they can neither raise their bodies from the ground, nor fly away."

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* This spring which still yields a good supply of surface water can hardly be said to be at the top of the rock, nor is the chapel, the walls of which are still seen standing about half way up.

† THE ISLE OF MAY.

Of the Isle of May, we are told:—"The most common birds there haunting are *Skouts* [Guillemots], *Dunters* [Eider ducks], *Guls*, *Kittiwax*, the last being about the size of a Dove is so called from the cry which it utters, and is of better flavour than a Partridge. It is very greedily eaten in the month of July. The Skout is less than a Duck and of the same colour, and its flesh is hard; however its eggs are bigger than Goose's, and boiled hard are very good eaten with vinegar and rock-parsley. Their shells are of a green colour, interspersed with black spots." The Island of May and the Bass are in conjunction brought into a Macaronic Poem of 1694, attributed to Drummond; for a knowledge of this I am indebted to Mr. J. T. Curry:—

Maia ubi sheapi-feda atque ubi solgoosifera Bassa
Swellant in pelago . . . . . .
. . . .
Quo viso, ad fechtæ noisam cecidere volucres,
Ad terram cecidere grues, plish plashque dedere
Sol-goosæ in pelago prope littora Bruntiliana.

The Isle of May is about ten miles from the Bass Rock.

There is no evidence in Blaeu's work that his informant who, as stated, was Robert Gordon of Stralloch, had utilised the writings of Major, Boece, or Turner, or was even acquainted with them, on the contrary that he had not done so is distinctly indicated by the omission of the story of a first fish rejected for a better one. Possibly his allusion to the egg being covered by the Gannet's foot may be from Gesner, but if so Gordon's informant has added on his own account that the egg could not be replaced, a specimen of his credulity, for the story is absolutely without foundation. The people of the place seem to have told the same story to Harvey in 1641, but such idle tales die hard, and accordingly we find Morer repeats it in 1702, and Defoe in 1724, while Brereton (1635), has furnished the further information that when the eggs were sufficiently incubated the Gannet stamped upon them to break them! Gordon is the first writer to call attention to the seaman's way of catching Gannets with a herring nailed on a board, which so many subsequent authors allude to but which it does not appear that any naturalist has ever been a witness to, though the fact is not thereby discredited. Blaeu, or rather, Robert Gordon, has also the credit of being the first who detected the union of the furculum with the keel of the sternum; and they likewise mention the Gannet's disinclination to fly over land.

25. "Excerpts from the Books of John Duke of Lauderdale" (1674–1678).

Communicated by the late Mr. Robert Romanes to "The Berwickshire Naturalists' Club," these interesting accounts, which have already been placed before the public by Mr. George Muirhead, are well worthy of reproduction; they will be here quoted from the Proceedings of the B. N. Club for 1873 (p. 90). It may be premised that the Bass Rock was purchased from Sir Andrew Ramsay in 1671 by the Earl of Lauderdale (afterwards Duke) in the name of the Government, Lauderdale being appointed by the treble title of captain, keeper and governor.

> 1674.—By pryce of Sollen-Geese of The Bass. The accomptant charges himself with the pryce of 1118

> Sollen-Geese, sold for 1lb.* 8s. 4d. each score, p. contract accordinglie, dated 10th June, 1674 . . £79 3. 10. sterling.
>
> To the climber of the Bass in full of his fee, waige, and allowance for the year and season 1674 . . . . £11 12. 2. sterling.
>
> 1675.—By pryce of 1060 Sollen-Geese, as the product of the Bass the season 1675, sold for 1lb. 9s. 2d. sterling each score, p. contract accordinglie, dated 11th May, 1675 .. .. £77 5. 10.
>
> To Charles Maitland in the Bass for his expense when he went to London with Sollen-Geese, p. his Grs. Order £20 0. 0.
>
> 1676.—By pryce of 1150 Sollen-Geese as the product of the Bass for 1676, sold as above, p. contract 24 May, 1676 .. .. £83 17. 1.
>
> 1677.—By pryce of 985 Sollen-Geese sold at 1lb. 9s. 2d. each score .. .. £71 16. 5½.
>
> 1678.—For the Sollen-Geese in the Bass for year and season 1678, Charles Maitland is settled with, and here is the agreement made with him thereanent :—
>
> "At Edinburgh, the 10th day of May, 1678, it is agreed upon and consented to betwixt Sr William Sharp of Stonyhill on the ane part, and Charles Maitland, son to Robert Maitland, keeper of the Bass, on the other part, That is to say the said Sr William Sharp setts and letts to the said Charles Maitland the whole Sollen-Geese of the Bass for the season 1678, for the sum of three score fifteen pounds sterl. . . . .
>
> . . . .
>
> Charles Maitland is also to give to me in this season two dozen good Sollen-Geese free."

If it was in Scotch coin Mr. Romanes would consider £79 3s. 10d., the price stated in the first paragraph to have been given for 1118 Gannets, as equivalent to £6 12s. of our present money, or nearly three-halfpence a Gannet, but Prof. Hume Brown has no doubt that English money is here intended, as it is marked sterling, in which case the Gannets were one shilling and fivepence each.

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* Mr. J. C. Tingey suggests that 1*lb* should read 1*li*, the correct abbreviation of the Latin *libra*.

We see how this price of seventeen pence a Gannet can be made to fit in with the following item of just the same date, which is taken from the journals of a Sir John Lauder in 1675,[*] for doubtless the slight discrepancy is sufficiently accounted for by the difference in wholesale and retail value :—

“ For botle aill	4 pence.
For a solen goose	29 „
For a mutskin of seck	10 „ [†]

26. “ Francisci Willughbeii Ornithologiæ Libri Tres.” (1676.) Pp. 15, 247. English edition. (1678.) Pp. 18, 328.

Ray's “ Itinerary ” has been already laid under contribution, but a few items of additional information are found here. Ray observes in the celebrated “ Ornithology,” which was jointly the work of himself and his friend, that when he and Willughby were at the Bass “ near Mid-*August* [Aug. 19th, 1661] all the other Birds were departed, only the *Soland Geese* remained upon the Island, their young being not yet fully grown and fledg'd,”—the same circumstance which struck me on August 29th, 1906, when I was there. In another place, in allusion to the Gannets' tameness, he says, "Upon this Island the Birds, being never shot at or frightened, are so confident as to alight and feed their young ones close by you" (p. 329). The figure in the "Ornithologia" has been already commented on.* The peculiar attachment of the skin to the muscles is here first mentioned.

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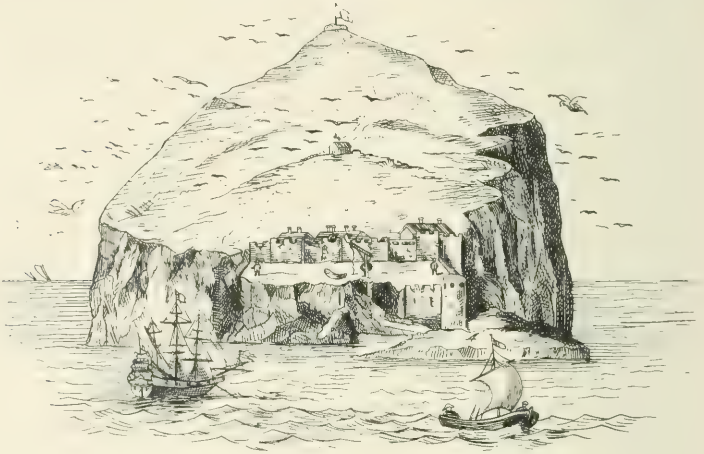
[*] Printed for the Scottish History Society, Vol. XXXVI. (1900) extract and reference furnished by Mr. H. S. Aldis.

[†] The Household Book of Taymouth, 1590—1626 contains no mention of Gannets.



THE BASS ROCK (AFTER SLEZER).

27. "Theatrum Scotiæ," by John Slezer (1693).

Contains quite a long account of the Bass Gannets but nothing we have not had before;† one of his two plates of the Rock is here copied with the omission of two large

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* *See* p. 30.

† Also repeated, I am informed, by J. Macky, in "A Journey through Scotland," 1723.

Gulls in the foreground. It shows what it was like when Ray was there.

28. Thomas Morer, author of "A Short Account of Scotland" (1702)—reprinted in Hume Brown's "Early Travellers in Scotland"—once again details the now familiar legend of the "solon" goose and its egg.

Summary of the evidence here cited.—Of the twenty-eight witnesses who have been cited in this lengthy history of the traditions of the past of the Bass Rock, it will be quickly gathered from the preceding pages that there were four writers at any rate who were merely copyists, viz., Olaus Magnus (No. 10), Aldrovandus (No. 14), Jonston (No. 20), and Childrey (No. 22). To some extent the same may be said of Gesner and Caius, for the facts which they give are for the most part what John Major had related. Major's admirable narrative stands on a different footing, for it is the relation of an eye-witness, which he may well have been, for he was born at Gleghornie, a few miles from the Bass Rock, and must have been a man of great intelligence and subsequently of great erudition. How far Hector Boece copied from Major is uncertain, but we cannot doubt that he was acquainted with his writings, as in all probability was Dean Turner. That Harvey went to the Bass is evident, but apparently he did not land upon it, nor does he mention the Gannet by name, while Defoe was such a mendacious writer that it may be questioned whether he really saw it at all. This therefore reduces the number of those who wrote from first-hand knowledge to five only, viz., Major, Swave, Brereton, Harvey and Ray, and of these the first is the best—John Major (A.D. 1521)—he who spent his childhood within sight of the lofty Bass, and had, there can be little doubt, been sometimes upon it. Briefly, the authors to be most relied on, and whose accounts are the best, with the dates at which they wrote, are :—

Walter Bower (or Fordun)	1448
John Major	1521
Hector Boece	1526
Peter Swave	1535
Conrad Gesner (?)	1555
Bishop Leslie	1578
Sir W. Brereton	1634
John Blaeu	1649
John Ray	1661

From all these, therefore, I have quoted as fully as it was possible to do, and especially from Blaeu, the Dutchman, who, thanks to his Scotch correspondents, has left us the independent narrative of one who was at the Bass prior to Ray's visit.

CHAPTER VII.

THE BASS ROCK—*continued.*

The Bass Rock continued—History of its Gannets in Modern Times—Extent of their former Breeding Area—Compared to what it is at present—Their Numbers now and formerly—The letting value of the Bass—Ray, Willughby, and other Naturalists who have visited the Bass.

Modern History of the Bass Gannets.—The Bass Rock, a vast and imposing mass, composed, geologists tell us, of clinkstone trap, much lower it is true than Ailsa Craig, yet rising majestically from the sea, attains to a height of 350 feet (ordnance survey), but if the fathomed depth around it be taken into account, its total height is much greater. There it has stood, defying the elements, impervious alike to time and weather, the home of the Gannet, none can say for how many centuries, or thousands of years. We have the testimony of Beowulf the Saxon that there were Gannets in the North Sea when his poem, which is ascribed to the sixth century, was written, and where are they likely to have been bred, if not on the Bass Rock ?

Grand are its cliffs, and quite dark also by natural colouring, but so bespattered are they, where they are highest and most precipitous, with the white splashings discharged by thousands of sea-birds that they have the appearance from a distance in summer and autumn of being composed of chalk. This anomaly struck Bishop Leslie in 1578 and William Harvey in 1641,* and no doubt many others. I have never seen these cliffs in the winter, but the late Mr. E. T. Booth, who knew the Bass Rock well, writes that the white stains of guano gradually disappear from the cliffs, and a transformation from white to a dark grey takes place.† The grass on the Bass is of excellent quality, which is supposed to be due to the mutings of the birds, and has been used to fatten twenty sheep, or more. Balfour suggests that the saline matter scattered by the spray of the sea contributes to its luxuriance. Beneath the castle there are some plants of *Lavatera arborea*, the Mallow of the Bass, which has rose-coloured flowers. The present owner of the Bass Rock is Sir Walter Dalrymple, whose ancestors have held it since 1706, when it was granted to them by charter from the Crown. I beg here to acknow-

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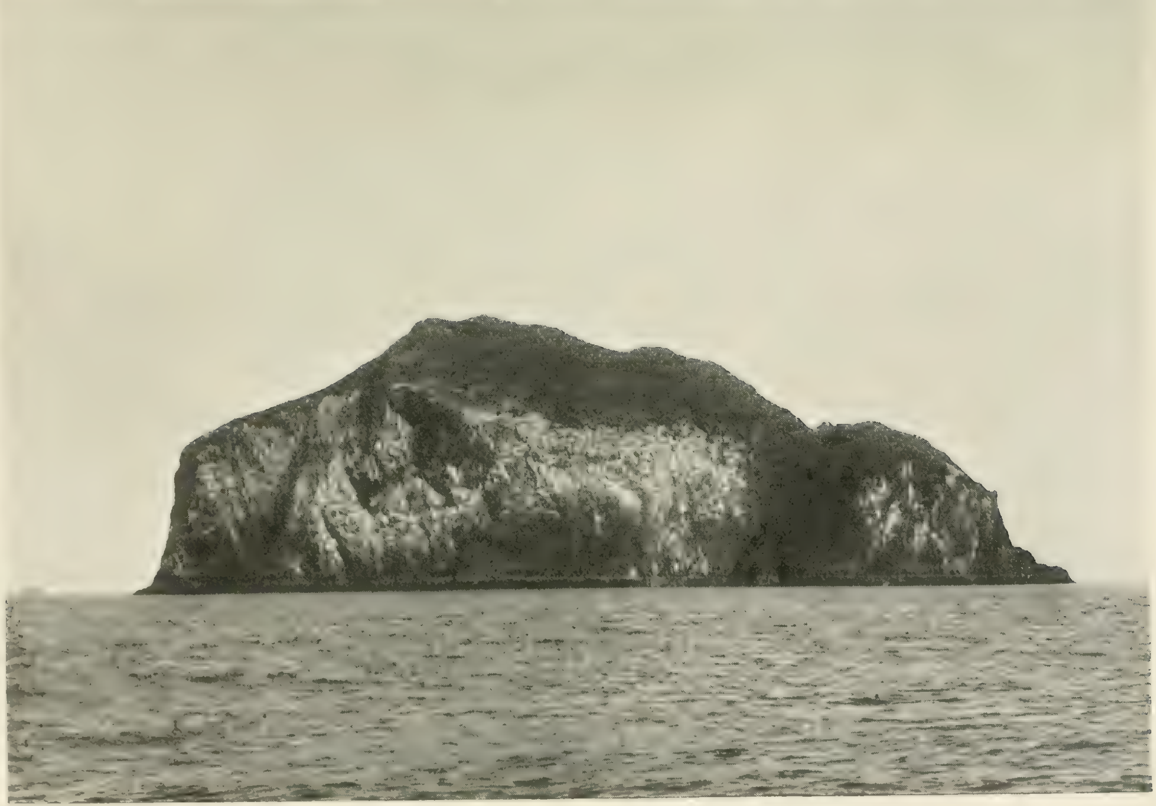
* *See* p. 200.

† "Rough Notes on the Birds observed during 20 years Shooting and Collecting in the British Islands," by E. T. Booth (1881-7), Part III. London.



THE BASS, WEST SIDE, FROM THE SEA.

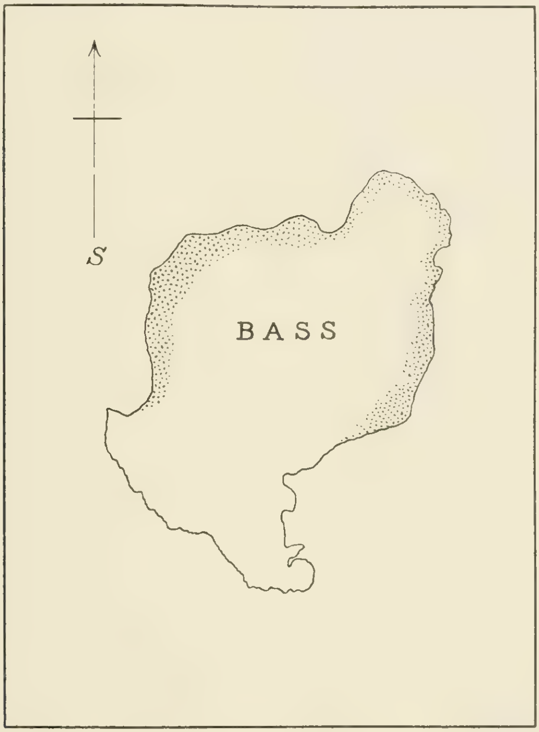
ledge his willingness to render assistance to an inquiring naturalist about the Gannets which have so long nested on Dalrymple property.

THE BASS, WEST SIDE. [H. Gurney, Phot.

The mighty Bass still seems a tower of strength. Years ago its impregnability and importance as a fortress were so great as to be almost proverbial. That was especially so in the time of the old chronicler Hector Boece, who, although he has had the character given him of being a mendacious historian, had truth and justice on his side when he termed the Bass " unwinnabill by ingine of man." To the naturalist and lover of scenery does it now principally appeal, and to such an one its chief interest centres in the birds, especially will any lover of birds be captivated by the spectacle of that " incredible noumer of Soland Geis," to which Hector Boece refers, not without some admiration. An account of their habits is reserved to a later chapter, but I should like to make some remarks presently on their numbers and natural pugnacity, which latter must strike anyone who goes to the Bass to watch the birds.

A view of the appearance of the Bass from the shore was given in the last chapter, but another is required of the west side, for it is there that a vast quantity of the Gannets breed, though they also cluster thickly from the north point to East Cove. Indeed, to do the Bass Rock justice, a series of photographs is wanted, such as I understand has been taken by Mr. William Evans. The dotted portion of the annexed map is intended to show approximately the area occupied by the Gannets, which breed round about three-fourths of the Rock.

Although there are not nearly so many Gannets here as at St. Kilda, nor even quite so many as at Ailsa Craig, there is still a vast number, and the eye soon wearies when looking at the multitude. I found the ceaseless movement of this maze of white flakes exceedingly trying to follow, circling about as they did at all heights from the level of the sea to four hundred feet. Constantly passing in and out and crossing one another, it is a marvel that they do not collide, but this never happens.* As to attempting to count even



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* This also struck Sir Walter Buller, who writing of a breeding-place of the Australian Gannet off Westland, New Zealand, remarks, "They were so closely packed together as they rose that it seemed to us quite a

a hundredth part of them, it is hopeless, and I soon abandoned the attempt. Let us imagine ourselves seated on the verge of those beetling cliffs, with the deep sea below, and throngs of birds passing and re-passing, whose wild cries, discordant as they are, seem to harmonise with the tenor of their surroundings. There is an old poem, four lines of which are very descriptive of this noisy hive of birds :—

> "The air was dirkit with the foulis,
> That cam with yawmeris and with yowlis,
> Whith shrykking, screeking, skyming, scowlis,
> and miklie noyis and showtes."*

Intensely interesting as are the whole of the cliffs, there is one spot which to my mind exceeds the rest, and it is one where the Gannets can be seen to perfection. This is the north corner, but one must go there when the wind is blowing towards that part of the Rock. Here, provided the wind is right—that is from the north-west or north-east—the

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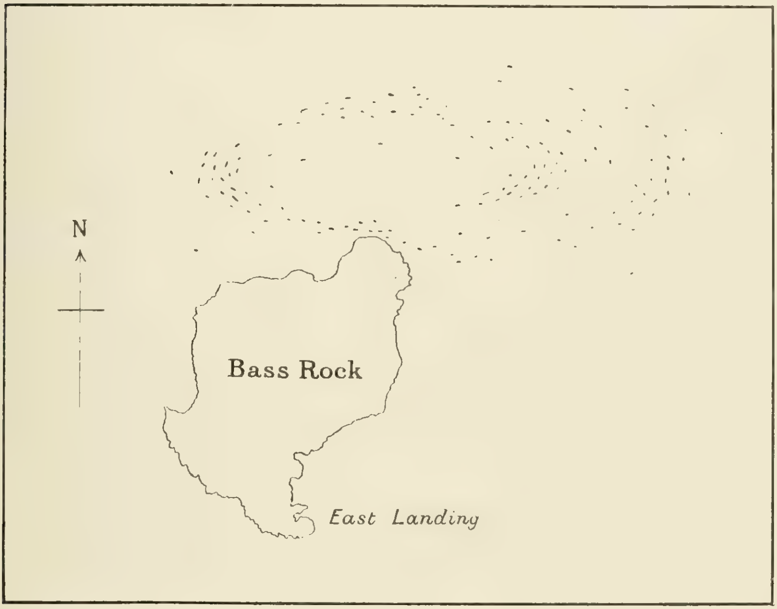
marvel that they could vibrate their wings so rapidly, and at such close quarters, without coming into actual contact with one another" (B. of N. Z., sup. 47).

* These lines are from "The Fenyet Friar of Tungland," written in the fifteenth century by William Dunbar. The fourth line is not given in all editions. A somewhat later poet, John Skelton, Laureate to Henry VIII., writes of "the gagling gaunte," but the earliest allusions to the Gannet in poetry are to be found in the Anglo-Saxon Chronicles (*see* pp. 20, 21).

observer securely secreted behind some convenient boulder, will possibly see scores of Gannets circling about, as shown in the sketch map, and going past again and again, many of them within a few yards of where he is standing. On one occasion (August 29th) I am reminded by my journal that I was close enough to the passing birds to see every motion of the tail and feet, which act the part of rudders to perfection, and to observe each slight turn of those great wings which at a little distance appear motionless, but yet on a close view are seen not to be so, for they undulate



with the weakest breath of wind. But there is one point to be remarked on, if the wind be from the east the Gannets will probably circle from left to right ; if it be from the west from right to left. At this same north corner the cliff projects at its base, extending seawards some sixty yards, and this reef or plateau is sometimes fatal both to old and young Gannets which appear to fall there, either by accident or from fighting, and are generally left to die. This point can only be landed on in calm weather, and I have

[*H. Gurney, Phot.*

THE BASS, EAST SIDE.

only been once upon it, when there were there five old Gannets which had been long dead, and a young one which had flapped out of its nest, and bit vigorously when I tried to catch it.

Date of Arrival and Departure of Gannets.—The Gannets come to the Bass at the end of February, some are rather later, in 1908 Mr. J. M. Campbell says some, probably owing to the mildness of the season, returned during the second week of January, but this was exceptional; at my first visit, which was on the 7th of March, 1876, I found what seemed to be the whole community already assembled. At first they fly round the Rock without alighting, a circumstance which did not escape Leslie's informant "Sche flies twa dayes still and continuallie round . . ." While this goes on, says the bishop, "Settis na man his heid out of the hous" (*see* p. 189). That is the dwellings which were inside the fort, the idea being that if undisturbed more Gannets would nest in accessible places, which was not a precaution to be neglected. Their importance for sustaining the garrison in time of war might be great.* Not only are the Gannets among the first birds to come, but they are also quite the last to leave: long after the Puffins and Guillemots and noisy Kittiwake Gulls have gone, the Gannets are to be seen in undiminished numbers sitting by their young ones, but I shall have more to say about their nidification in another chapter. Their longer period of incubation and the slowness with which the young mature account for this prolonged stay. As one by one the young Gannets quit the nesting ledges the old birds go too, so that from the end of August to the end of October there is a continual diminishing of their ranks. I thought it melancholy, as September gradually passed, to see the ledges each day getting barer ; and for the three men who since 1902 have made the new lighthouse their home, it must be like desolation stealing over the Rock when all its bird-life melts away. But there are some happy exceptions, for instance, on November 1st, 1906, Mr. Laidlaw, the principal,* was rejoiced at perceiving—what to him and his mates must have been a cheering spectacle—no less than 200 fine adult Gannets sailing round and about the Rock. However, very few of them as a general rule are to be seen in November.

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* An importance alluded to in a letter from Sir John Dalrymple to Lord Melville, written June 23rd, 1689, printed by Sir W. Fraser ("The Melvilles," II., p. 113).

Odour arising from the Cliffs.—The smell on the Bass Rock arising from the birds is not altogether pleasant, indeed a man who is not accustomed to it may be almost overcome, as in fact happened to one of our party, who, having with difficulty mounted the steep ascent, was obliged to lie down and recover himself before proceeding further. This is due to the fact that young birds, old birds, nests, eggs, everything connected with the Gannet in this very crowded nursery, has a strong taint of ammonia. When the wind is strong the fishermen say they can perceive a pungent smell proceeding from the Bass, and its fish-eating inhabitants, when miles away at sea. This obnoxious odour is augmented by the liquid arising from rain and spray, mixed with the excreta of the birds, with which the rocks are bespattered, and the undigested remains of fish, which the old Gannets bring home, and throw up—the large fish being ejected singly—the small ones sometimes in parcels. These fish are left on the ledge, and as the young Gannets, when that is the case, will never, I believe, touch them, they rapidly decay and putrefy. To this is added the occasional carcass of a dead Gannet, and the smell of the nests themselves, which, according to Mr. Booth, who probably descended the ledges much lower than I did, give forth a steam under the rays of the summer sun after a wet morning, which is positively overpowering.*†

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* In 1908 Mr. J. M. Campbell succeeded Mr. Laidlaw as principal of the lighthouse on the Bass.

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* "Rough Notes," Vol. III.

† In South Africa the manurial deposits of Gannets and other sea-birds which breed on flat islands is held of the highest value, but the climate

Pugnacity of Gannets in the Breeding Season.—Although not incapable of flight as are the Penguins of southern seas, like them the Gannets resort to biting to defend themselves. In situations from which they cannot readily fly, they depend

THE BASS ROCK. [*H. Gurney, Phot.*

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is drier there, some of the guano islands, as I learn from Col. Feilden, being practically in a rainless area: no use has ever been made of it at the Bass, where the dung is washed down by rains into the sea.

a good deal on their sharp beaks and know how to make use of them, as the sailors of Jacques Cartier found out to their cost in 1534,* and as many a rash handler has discovered since. They struck me as being especially quarrelsome on the Bass Rock. I remember on my first visit how it was not long before a scene of strife presented itself, very characteristic of their natural combativeness. Two Gannets—adult birds, which looked old and solemn enough to be patriarchs of their clan—had their respective nests very close together, on the same ledge; on settling down they had touched beaks and greeted one another, but simultaneously they espied a large piece of seaweed on the ledge. First one seized it, and then the other, and then began a tug of war, each having hold of one end of the disputed nesting material, until finally the stronger bird dragged off the seaweed. The arrival of a fresh comer on a ledge already occupied was generally a signal for strife, especially if in securing standing room for himself he pushed another Gannet off. If this did not happen, the two birds struggling together would probably for want of room get too near the brink, and in due course topple over the precipice, sometimes locked in a very unfriendly embrace. After an interval in mid air they are seen to hit the water far below with a great splash, where, none the worse for the descent, they generally fall to fighting again, and one seizing the other by the beak spins him round until the white foam froths around.*

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* Hakluyt's "Voyages," III. Cartier's narrative will be referred to again in Ch. IX.

GANNET AND YOUNG. [J. C. Adams, Phot.

Occasionally, I was told, they strike a rock in falling and break a wing, and Mr. Campbell has known them to be caught by the leg in a fissure, and so perish.

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* In his "Avifauna of Laysan" (I., p. 24), Mr. Rothschild gives a curious photograph of a *Sula cyanops* fighting with a Frigate Bird, which shows that our Gannet is not the only member of the genus to be pugnacious.

It appears that young Gannets, of whose doings I have had less experience, are just as spiteful and quarrelsome as the old ones, for Mr. E. T. Booth in his his "Rough Notes" (Vol. III.) notices that :—

"The young Gannets at the age of a month or six weeks (their black faces surrounded by tufts of down which strongly resemble white nightcaps) are exceedingly comical, though for the most part ill-tempered and peevish little tyrants. When first they waddle a yard or so from their nest, it is most commonly to pitch into some smaller and more helpless infant, which is not infrequently seized by the back of the neck and shaken in the most pitiless manner. Though the injury they are capable of inflicting on one another is slight, their battles are often attended with fatal results; one or other, or occasionally both, of the combatants lose their balance, and rolling from the ledge, fall over the precipice and are dashed to pieces on the rocks below. Even the old birds are at times spiteful to youngsters that intrude on their quarters or are imagined to threaten their own offspring. Any unfortunate which has slipped from its nest to some lower ledge during the absence of the parent receives unmerciful stabs from the powerful beak of every adult it approaches, and in the end is either hammered to death or forced over the cliffs. On the north and east sides of the Rock the tide bears away all signs of such accidents." With such a character for quarrelsomeness, it is a wonder that there is any harmony at all in this thickly-packed nursery of birds, and that so many young Gannets are ultimately safely brought through the danger is rather a matter for surprise also. It may be put down to the Gannets' credit, that in 1909 a downy nestling which had fallen from its ledge, was recovered by Mr. Campbell and placed in the nest of a pair which had no young one, and was at once successfully adopted.

Former Breeding Area.—Time was—that is to say, some 350 years ago—when the Gannets' breeding ground was evidently much more extensive than it is now. At that period, their nests, carefully protected from harm, must have reached over all the upper portions of the Rock. In those days the men of Haddington knew they had got something worth taking care of. Not only did the occupants of the Bass do all they could for the great birds, but in 1592 the State had stepped in, and enacted that for their value, and for the "great commodity" which they afforded to "the subjects of this realm" they were to be honourably protected by Parliament.* In 1651 we find the celebrated physiologist William Harvey, speaking of the slopes of the Bass as so thickly covered with nests that a man could scarce find footing, which even admitting some slight exaggeration, shows how numerous they must have been. In 1693 Slezer speaks of " the surface of it [the Bass] being almost covered with their nests, eggs and young birds."* In 1769 we find Thomas Pennant remarking† that there were still multitudes of nests near the sloping part, which must have meant the grass part, but Pennant did not land on the Bass. In 1816 Sir William Jardine writes of there being still nests on the summit of the Rock (" Nat. Lib.," XIV., p. 245). In 1831 Macgillivray says that he found 300 nests on a gravelly slope near the landing place. In 1859 Robert Gray writes that they had not yet abandoned the upper slopes,‡ *i.e.*, the grass slopes, where Professor Cunningham observes there were still some as late as 1862, and where even in 1869 Mr. William Evans remembers nests well above the present limits.

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* Acts, Jac. VI., 1592.

Persecution of Gannets.—But the Gannets ceased to be appreciated, and invention, with the consequent cheapening of firearms put guns into everybody's hands. The public taste in eatables had changed. There was no demand for them, thus they became no longer worth protecting. Evil days came upon the Gannets when their principal

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[*] "Theatrum Scot.," edition 1718, p. 42.

[†] " A Tour in Scotland " (1790), II., p. 60.

[‡] "Birds of the West of Scotland," p. 460.

value was thought to be only as a mark for sportsmen.* Colquhoun says that there was one year when the whole west front of the Rock was depopulated.† Of this unfair shooting a strange tale is told in St. John's "Natural History and Sport in Moray,"‡ 1863. This sort of treatment—which Booth also complains of—must have gone on for a good many years, for when I was at the Bass in 1876 the lessee still bitterly resented the numbers shot after the 1st August, many of them even while flying with fish to their young ones, adding with emphasis that he had seen the sea strewn with dead Gannets which the shooters did not take the trouble to gather up after they had shot them. Such wanton waste of life, whatever species of bird it be, cannot be too strongly condemned. It gives a few brief hours of amusement to three or four individuals, but at the expense of many others with better inclinations, who prefer watching the birds to destroying them. Now, happily, protected by the arm of the law (*i.e.*, the "Wild Birds Protection Act," 1880) during the summer months, the Gannets have been—since 1885—comparatively free from molestation at, and in the vicinity of, the Bass,* while still further was their well-doing insured in 1905 by the County Council of Haddington extending their close time from August 1st to November 1st, throughout the islands under their jurisdiction.

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* *See* Fleming, *t.c.*, p. 405, and Jardine's "Contributions to Ornithology," 1850, p. 117.

† "The Moor and the Loch," I., p. 274.

‡ p. 204, *note*.

Nidification.—A great deal might be said on this head, but it will be better to reserve the nidification of the Gannets for a subsequent chapter. The young ones used to be taken early in August. In 1768 they were advertised in Edinburgh market on August 5th,† but at some other breeding places they were not considered ripe until September 1st. Much, of course, depended on whether or not their first layings of eggs had been taken. In 1906 very few young ones had left the Bass on September 1st, but they were passing the stage at which they were fattest. In 1909 Mr. J. Campbell of the lighthouse saw the first young one on May 15th, on the other hand, in 1907 Mr. H. N. Bonar could only find five hatched on June 17th. The usual nesting material is sea-weed, but on August 21st of that year Mr. Evans noticed that the Gannets were busy carrying straw—of which a quantity happened to be floating close to the Rock—to their nests, where they could be seen tucking it under their downy young ones, for there were still plenty in that stage, although others were full fledged. Mr. Pike's snap-shot exhibits a Gannet in the act of presenting his mate with sea-weed, in this case stolen from another nest, not at all an uncommon theft.

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* Yet in "The Field" of August 12th, 1893, C. T. writes of the finding of a heap of empty cartridge cases on the Bass, and of seeing the dead bodies of sundry old Gannets lying about on the Rock.

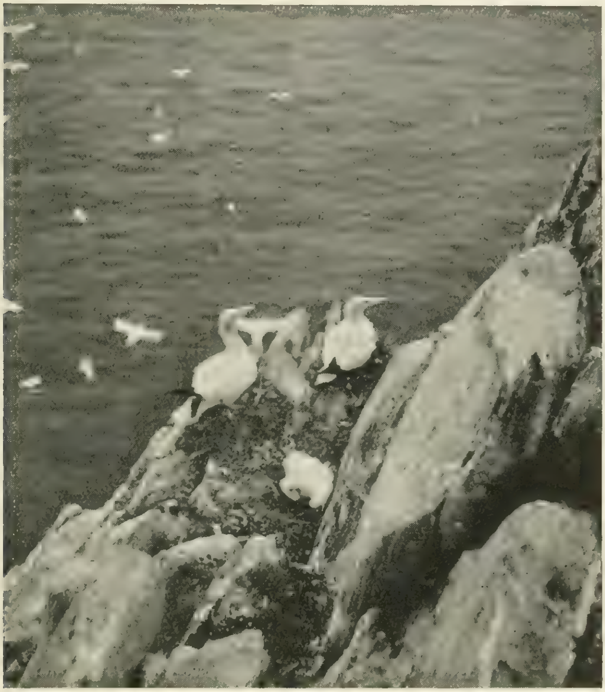
† *See* Thos. Pennant, "Tour in Scotland," i., p. 61.

[O. G. Pike, Phot.

GANNET CARRYING SEA-WEED.

Number of Gannets on the Bass.—There have been many attempts to guess at the number of Gannets on the Bass Rock, but there, as at Ailsa, we must bear in mind how often the incorrectness of such guesses at large numbers of living objects has been proved. It is so, partly because guesses mainly go upon what the eye takes in, and partly because there are few things more misleading to human vision than birds in movement.

The first well-considered estimate we have of the Gannets on the Bass is that by Professor Fleming, who is cautious in what he says in the "Zoology of the Bass"—but, "considering 1800 as rather a high number of young birds annually removed from their nests before being able to fly,



[H. Gurney, Phot.

GANNETS AND NESTLING.

and taking into account those old birds which select inaccessible positions," he concludes that 10,000 adult birds would be tolerably near the truth.*

In 1901 Mr. William Evans concluded after taking observations from different points that Professor Fleming's 10,000 was not too high, but in 1904, having done several photographs of the cliffs from the sea, he altered his opinion and rated the strength of the Bass at from 7000 to 8000 adult Gannets.†

Mr. Evans has devoted both time and thought to the matter, and has visited the Bass on several occasions for the express purpose of attempting a census of the Gannets by means of photographs, and his judgment is no doubt a considered one. One of the photographs taken by Mr. Evans having been submitted for examination, I had it minutely scrutinised (after dividing it into four sections), through a large magnifying glass, with the result that it was thought by the scrutineer to exhibit about 960 Gannets. Mr. Evans, on the other hand, thought it contained as many as 1500. But it is exceedingly difficult to say whether many of the white specks on it are merely whitewashed rocks, on which the birds have been sitting, or the birds themselves. This photograph is considered by Mr. Evans to cover at least a quarter of the cliffs which comprise the breeding area of the Gannets. Allowing that there may be in the photograph 1200 adult Gannets, that multiplied by four would only be 4800, and if to that we add 700 for Gannets on the wing, but not far from the Rock, and another 800 for members of the settlement away on fishing expeditions—though the latter is a mere guess—the total comes to 6300.

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* *t.c.*, p. 395.

† *See* "Proc. R.P.S. Edinburgh," 1906-7, p. 63, *note.*

[*H. N. Bonar, Phot.*

GANNET WHEN ALARMED.

Another way to estimate these Gannets is by taking as a standard of comparison the piebald, or two-year-old birds, whose mottled backs render them very conspicuous, especially when viewed from above. During the three days that I was at the Bass in 1905 there may have been on an average fifty of these piebald Gannets. After looking round and making a mental computation, I held that it was fair to say that for every piebald Gannet there were a hundred white ones, that is, adults. This would give 5000 adult Gannets, but Mr. Laidlaw, of the lighthouse, says that every evening many more adults come in from fishing. Let us put this nightly accession at 750, and if we hazard a guess that 750 more belonging to the Bass remain at sea, the majority of which would be male birds or non-breeders, we get a net result of 6500 Gannets forming the Bass Rock community.

A third way of forming an estimate is by calculating from the number of young ones which used to be killed, and here we are on safer ground. These Bass bird-harvests are of very old date, and fortunately we have returns for so far back as the seventeenth century.* We learn from them that in 1674, 1118 young Gannets were gathered; in 1675, 1060; in 1676, 1150, and in 1677, 985. From that date until the end of the eighteenth century we have no further returns, but then comes in Dr. John Walker's record in his "Essays" of 1296 young ones taken in one year—probably a year between 1764 and 1770—but this is not particularised.*

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* *See* p. 215.

In 1848 we find Professor Fleming writing, in his article before quoted, of 1800 young Gannets, as if he actually knew of that number having been taken ("The Bass Rock," p. 395). In 1850 John Wolley says 1700 were taken, and adds "about half," meaning probably that George Adams, the keeper, had told him it was about half the young ones, and that nearly as many more had been allowed to fly ("Ootheca Wolleyana," II., p. 455). In 1865 Mr. E. T. Booth puts the number of young gathered at about 1500, and in 1874 at 800,† and in 1876 I was told it was still about 800.‡

Of these figures the highest which can be relied upon is 1700. We may hold Wolley's authority to be sufficient for that number of young Gannets taken in 1850. Now, 1700

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* "Essays on Natural History" (1808).

† "Rough Notes," III.

‡ In September, 1885, Downie the lessee told Mr. Evans that he had taken 2000 eggs but no young ones that year, indeed, they had ceased to be taken. In 1880, about 1800 eggs were taken: at the present time the number gathered is about 100, but no one eats them.

Gannets would have had 3400 parents, and I am not inclined to think there could have been more than another thousand pairs which failed to rear their young, or whose nests were inaccessible, although Wolley seems to have been told there were more. If to this we add 200 for non-breeders, it only makes a total of 5600 adult Gannets.

A fourth way is by mental comparison with Mr. Harrison's 8000 tame Geese at Halsall (*see* p. 111). After reflecting on what we saw on my last two visits, as compared with the photographs which Mr. Harrison furnished me with, I should judge the adult Gannet population on the Bass to fall short of the tame Geese at Halsall by nearly a thousand.

These methods of approximate counting give us the following results :—

By Professor Fleming's estimate	10,000	adult	Gannets
,, Mr. Evans's estimate	7,500	,,	,,
,, Mr. Evans's photographs	6,300	,,	,,
,, counting piebald birds	6,500	,,	,,
,, the young ones formerly taken	5,600	,,	,,
,, comparison with tame Geese	7,000	,,	,,

Whatever the number be, it is possible that there were more 150 years ago than there are now, the upper portion of their breeding area having undergone much diminution; at the same time old North Berwick fishermen have told Mr. Bonar that when driven from the slopes the Gannets sought out several new sites on the cliffs, where they had not bred before, and Mr. Evans thinks that he saw more on the Rock, when at the Bass on August 21st, 1909—about 6 p.m.—than he had ever seen before. As the young are no longer taken, a portion of them probably find their way to other settlements, but, as will be shown later, it seems likely that there is a great mortality of young Gannets after they are old enough to take the sea. Both Mr. Henry Gurney and I thought there were more Gannets at Ailsa Craig than at the Bass Rock, but I have reckoned them both at 6500, not counting young ones in either case.

Besides Gannets there are many other birds which breed on the Bass; unquestionably the Guillemot is nearly as numerous as the Gannet, and there cannot be far short of 2000 Kittiwake Gulls nesting there.

Letting Value of the Bass from 1535 *to* 1767.—Several early writers testify to the great pecuniary value of the produce of the Bass Rock. Peter Swave, the Dane, was told in 1535 that the commander of the fort annually collected 400 gold pieces—probably the pound of Henry VIII.—as the produce of the Gannets, which seems almost incredible did we not know the very great value formerly attached to the Gannets and their grease. In 1618 John Taylor, the poet, says, the lord of the Bass profited at least £200 a year by the Gannets, which, although apparently only half the amount Swave had been told, is the same sum which was mentioned to Sir William Brereton on the spot in 1635, and therefore may be considered correct. William Harvey, who was at the Bass in 1641, notes that the sum named to him as rent exceeded credibility, but he does not say how much it was, and the next we hear about it is, in 1661, from Ray, who puts the rent at £130. In 1678 it was only £75, so probably it had gradually gone down. Yet the taste for Gannets had not diminished, if we may judge from the encomiums pronounced on them in 1684 by Sir Robert Sibbald. "The art of cookery," says this worthy knight, "cannot form a dish of such delicate flavour, and combining the tastes of fish and flesh, as a roasted Solan Goose." Slezer termed it the most delicious fowl on the Bass, and other people seem to have held the same opinion about its wonderful qualities, when properly dressed for the table, yet so powerful was the smell of the bird that it could not be cooked indoors. In all the cases here mentioned Professor Hume Brown feels there can be no doubt that English money is intended, and not the coin of Scotland. In his "Essays on Natural History," Dr. John Walker gives a Dr. and Cr. account of the rent of the Bass, and other attendant expenses, from 1764 to 1767, with a statement or schedule of the produce of the Bass.

RENT OF THE BASSE.

	£	s.	d.
Rent to Sir Hugh Dalrymple,[*] Baronet, the proprietor, 840 merks, or	[†]46	13	4
To the climber, 100 merks, or	5	11	$1\frac{1}{3}$
To seven men employed in catching the fowls, 16£ Scots each, or	9	6	8
To the carrier, thirty-six times to Edinburgh, 2s. sterling each time	3	12	0
	65	3	$1\frac{1}{3}$

PRODUCE OF THE BASS.

	£	s.	d.
They take the Solan Geese thirty-six times in the season, and at a medium thirty-six every time [1296 Geese]; which at 1s. 8d. sterling each, is	108	0	0
Sheep's grass	5	0	0
Ten Scots gallons of oil, drawn from the fat of the fowls, at 8d. sterling each pint..	2	13	5
Ten stone weight of feathers, at 10s. sterling per stone	5	0	0
	120	13	5

From these accounts the young Gannets seem to have been collected four days a week at least, in order that the Edinburgh market should have a constant supply of them. This market would appear to have gone by the name of "The Poultry," and an advertisement of this very date is quoted from the "Edinburgh Advertiser" in Pennant's "Tour in Scotland" (I., p. 61), which runs as follows :—

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[*] The Dalrymples obtained a grant of the Bass in 1706.

[†] The rent charged for the Bass in 1767 is higher than the rent of Ailsa Craig in 1772 (*see* p. 82).

> SOLAN GOOSE.
>
> There is to be sold, by JOHN WATSON, Jun., at his Stand at the Poultry, *Edinburgh*, all lawful days in the week, wind and weather serving, good and fresh *Solan* Geese. . . . Aug. 5, 1768.

Letting value since 1820.—In 1820 E. G. Fleischer says the Bass was let to a Mr. Whitecross for £35 ("Isis," 1821, XII., L. A. 330–4); in 1825 Selby says the rent was £60 ("British Ornithology," II., p. 456); in 1841 it was only £30 ("Statistical Account of Haddingtonshire"). In 1860 the tenant's name was Adams—what rent he paid I have no means of knowing, but Mr. Harvie-Brown says that he used to charge visitors 2s. 6d. for each adult Gannet shot within a certain distance of the Bass. At that time according to Mr. J. le Bas, large numbers were still being sent up to Edinburgh, and retailed at one shilling and eight pence apiece.* Mr. H. S. Gladstone has obliged me with one of Adams's advertisements of his Gannets' eggs.†

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* "Land and Water," February 27th, 1869.

† Pasted into a book which had belonged to Sir William Jardine, and is now the property of Mr. Harvie-Brown.

THE SUBSCRIBER OFFERS FOR SALE
AS ONE OF THE
MOST RARE DELICACIES OF THE SEASON,

SOLAN GEESE EGGS, which are highly appreciated at the Royal Table, as testified by the following quotation from the Right Hon. Earl Grey's letter to a friend who forwarded them:—

> "Buckingham Palace, May 6th, 1856.
> "I duly submitted the eggs (Solan's), which were as duly "handed round the table, universally tasted, and admitted to be "indistinguishable from Plover eggs. Royal thanks are therefore "your due, the expression of which I am commanded to convey.
> "Yours truly,
> (*Signed*) "GREY."

PRICE 6s. PER DOZEN.
Geo. Adams, Canty Bay, North Berwick.

In 1876 the tenant was Mr. Kendall, who told me his rent was £20, and that he depended mainly for paying it on the Gannets, of which he and his men still took nearly 800 every year. It was worth his while he said to keep five or six women plucking them at 1s. 6d. a day. A good many were at that time dispatched to Sheffield, some of them being cooked in ovens before being sent off. I can remember these ovens as far back as 1876. They were of brick, and there was one at least large enough to cook four Gannets at a time, the shed in which this large oven, or a successor to it, stood, was still existing as recently as 1901. Mr. Harvie-Brown says it used to be the plan to wrap the plucked Gannets up in rhubarb leaves, before putting them in the oven. Mr. Harvie-Brown remembers that Kendall was succeeded by Downie. The trade in young Gannets has come to an end ; at the present time very few are taken, and the rent has dropped to about £17, which is paid to Sir Walter Dalrymple, the tenant recouping himself entirely by visitors' fees, and not by the sale of the birds. The fat of young Gannets was largely used in the vicinity of the Bass Rock, up to about 1875, for greasing cart and wagon wheels. Mr. Kendal at that time depended on farm machinery to take a large part of the supply, its chief recommendation being that it was cheap. Mr. Kirkpatrick told me he remembered its being used, and, as a young man, had often helped his father, when they would fill many score barrels with the grease of these birds, which they peeled off as far as possible in layers. One of the large coppers in which it used to stand and simmer was still to be seen on my last visit to Canty Bay, but it had been moved from its original position. This copper, when it stood in the shed, was supplied with a small furnace underneath, which kept the grease boiling, and as it yielded to its heat. it was drawn off in a liquid state through a bunghole covered with muslin (which intercepted any pieces of integument) into bottles. Each young Gannet was expected to yield ¾-lb. of oil, and was below par if it did not, and Mr. Kirkpatrick remembers that, in his father's time, the price long kept up to two shillings and sixpence a gallon.

Naturalists who have Visited the Bass.—In closing this long account of the Bass, I cannot refrain from recalling to memory a few of the names of the many distinguished naturalists who have made a pilgrimage to the Bass Rock in the interests of science. It is an easy enough expedition nowadays to go and see the Gannets there, but it was a very different matter when those two early pioneers of ornithology, the illustrious John Ray and Francis Willughby, sprung ashore on that narrow landing place, which led up to the castle, on August 19th, 1661. The Rock and castle must have been very like Slezer's picture (*see* p. 218), though the garrison of soldiers had been withdrawn nine years before Ray's visit, no doubt taking with them the three cannon which commanded the landing-stage. In the year 1835, on the same day of August that Ray and Willughby were at the Bass—but 174 years later—two other naturalists nearly as distinguished—William Macgillivray and J. J Audubon, the American, together with the son of the former—also found themselves there by a coincidence which was no doubt not undesigned. Macgillivray, who had already been there in 1831,* gives some brief account of this his second visit in the "History of British Birds" (V., p. 412), but does not enter into many particulars. There is no more faithful history of the Gannet than that in the fifth volume of Macgillivray's "British Birds," and it is pathetic to remember that within five weeks of the publication of this, his final volume, the author died.* Among other naturalists who are known to have been to the Bass were Thomas Pennant on July 18th, 1769, William Bullock—who has left us his journal, and one of whose Gannets, a 2nd year bird, greatly faded, is still at The Natural History Museum—Arthur Strickland in [May ?] 1807, Sir William Jardine in 1816 and 1820, P. J. Selby about the year 1825, and John Wolley in the years 1848, 1850, and 1851 ("Ootheca Wolleyana," II., p. 453),—all of them naturalists eminent for their attainments. An extract is here given from William Bullock's journal:—

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* *See* Audubon, "Orn. Biog." (1838), IV., p. 233.

"In the spring of 1807," he says, "I visited this celebrated rock (once the State prison of Scotland), accompanied by Arthur Strickland, Esq., of York, for the purpose of procuring specimens of the various water-fowl that annually resort to it at that season of the year for security during the important business of rearing their young. We arrived under the towering and tremendous projecting cliffs of the east end, just before sunrise, and approached as silent as possible. At a little distance the precipice appeared as if composed of chalk; but on a nearer approach we discovered that this effect was produced by the excrement, as well as by the white plumage of the innumerable water-fowl that covered the cliffs. The whole of the various families were just awake, and preparing, by shaking their feathers and pluming their wings, for the busy occupation of the coming day. . . . The Gannets were sitting close to each other on their eggs. We crept cautiously down among them, and so attentive were they to their occupation of sitting that it was with difficulty they could be forced from their eggs, though at other times they are extremely shy. They lay but one, which is perfectly white, and in shape and size nearly resembles that of a crocodile; it is placed on the bare rock, surrounded by a circle of wet seaweed, which is constantly replenished by the male as it becomes dry.* I had been told, but doubted the fact, that during the time of incubation the female holds the egg in her foot; this I found to be the case. In a visit I made in the August following [1807], the young were many of them gone."†

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* On September 8th, 1852, his wife predeceasing him by seven months and his friend Audubon by thirteen months.

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* *See* p. 98.

† "A Companion to the London Museum and Pantherion," by William Bullock, 1813.

In July, 1844, there was an excursion of Glasgow botanists to the Bass.* In August, 1850, there was an excursion of the members of the British Association to the Bass from Edinburgh, which included John Wolley, H. E. Strickland, and other scientific men. Mr. J. A. Harvie-Brown's first visit was in 1859, and in the same year Robert Gray, author of "Birds of the West of Scotland," revisited it, and remarks on the change which had taken place in twenty years. Professor Cunningham was at the Bass in 1862, and also Mr. E. T. Booth, whose admirable history of the Gannet in "Rough Notes" was partly the result of that and subsequent visits. One of the best descriptions of the Bass Rock is by Mr. H. F. Witherby, who was there on August 24th, 1893, and May 22nd, 1894.† Another good account is to be found in "Adventures in Birdland," by O. G. Pike, who was there in 1905. In the "History of The Berwickshire Naturalists' Club" (XVIII., p. 25), there is a full report of a visit of the club to the Bass on June 19th, 1901, which it seems was largely attended.

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* *See* "Phytologist," II., p. 222.

† "The Bass Rock and its winged inhabitants" ("Knowledge," February 1st, 1895).

CHAPTER VIII.

THE FÆRÖES AND ICELAND.

Gannets' Breeding Places continued—Myggenæs in the Færöes—Number of Gannets there—The three Icelandic Settlements—Quotations from the Icelandic Naturalists, Olafsen, Olavius, Mohr, Faber—Probable Number of Gannets in Iceland.

Myggenœs in the Fœröes.

The Early History of its Gannets.—Having now finished with the nine Gannet settlements which are located around the British Isles, it remains to treat of those further away, viz., such as are in the Færöes, in Iceland, and on the east coast of Canada, where the existence of communities of these birds has long been known. To begin with the Gannetry on the Færöes or Faröes (Danish, Færöerne, that is, "Sheep Islands"), which lie half-way between Iceland and the northern extremity of Scotland: in his "Færoæ and Færoa Referata" [Description of the Islands and Inhabitants of Foeroe],* 1673, Lucas Debes has cited (p. 183) an ancient legend about the coming of the Gannets to Myggenæs, the same island where they now breed. These old legends go back a long way, sometimes even to the fourteenth century, and this one indicates a high antiquity for this comparatively small Gannet settlement. Passing over this early record,—and also Charles Clusius' young Gannet in 1604,* as it is not clear whether it was taken here or in Norway,—the first author to be quoted is Lucas Debes.

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* "Færoæ and Færoa Referata." Published at Copenhagen in 1673. English translation, 1676, German, 1757.

1. In his "Description of Færoe," Lucas Debes, after describing sundry geese, turns to the fowl "principally worth taking notice of; it is called Sule, and is found nowhere in *Feroe*, but on the Islet or [? of] *Myggoness*† [*i.e.*, the horn] whereof the Inhabitants have yearly a great help to their house-keeping, they rehearse a strange Fable of the reason wherefore that Fowl is only found there, and nowhere else, whereof we will speak in another place [*see* p. 183]. The Sule is a pretty great Fowl being of a blueish grey, it is also found in *Scotland*, and is called by Seamen, a Gentleman." Debes must be here referring to the young in the

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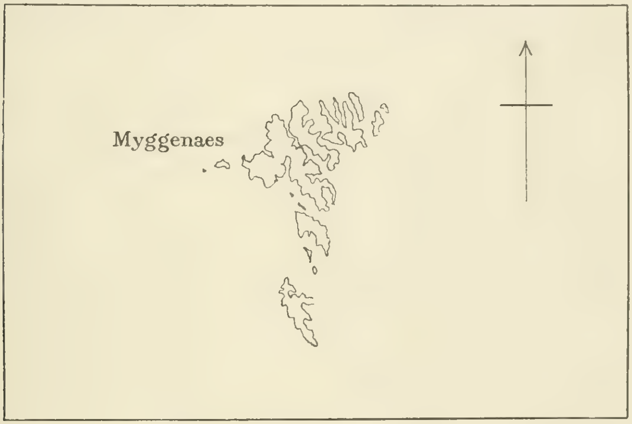
* *See* p. 17.

† Mr. Eirikr Magnússon, whose help I gladly acknowledge, is of opinion that the old form of this word must have been mykines, *i.e.*, muckness=guanoness [myki=muck], the modern Faroese name being mikjines, meaning the same, and that the myki-guano must be taken to be Gannet guano, but there is no evidence that this guano was ever collected for agricultural purposes.

slate-coloured garb of the first year; the epithet "blue" was formerly used of animals in the sense of dark slate-coloured.

2. Svabo, writing in 1782—that is, more than a hundred years after Debes—says in his MS.* that the old Gannets were taken twice in the spring to the number of 200, and that the yearly take of young ones was about the same.



3. Jorgen Landt. "Forsög til en Beskrivelse over Færöerne." Kjöbenhavn (1800 †).

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* MS. as quoted by Col. Feilden, "Zoologist," 1872, p. 3286. The original, which is at Copenhagen, is no doubt in Danish.

† P. 73. An English edition, entitled, "A Description of the Feroe Islands, by the Rev. G. Landt," was published at London in 1810, but it is not so literal as Professor Newton's translation. The Gannet is described at pp. 236 and 259

Landt's account, the following translation of which is by Professor Newton, seems to be partly copied from the Svabo MS. at Copenhagen.

TRANSLATION.

"Myggenæsholm lies westward of Myggenæs, about 20 fathoms distant, and seems to have been formerly riven from that island by a natural revolution. The holm is nearly $\frac{1}{4}$ mile long,* 800 ells broad, and consists of small basaltic columns placed close together.

. . . .

Pelecanus Bassanus. Lin., Sula. A Bird commonly known to sea-faring people as Jan van Gent [John of Ghent or Gannet], which neither builds its nest nor settles itself anywhere in the Færöes but on Myggenæsholm alone, and the drongs or rocks standing close by. It shows itself on the 25th of January, which is one of the feast days [Conversion of St. Paul] in the islands ; and its departure is on St. Martin's day [11th of November]. In the middle of April it lays two eggs† which are hatched in 4 weeks, but the young first take flight in September. The old Sula is white and fully as big as a Goose, but the young is grey, and first gets its full colour in the 3rd year, in the meanwhile bearing the

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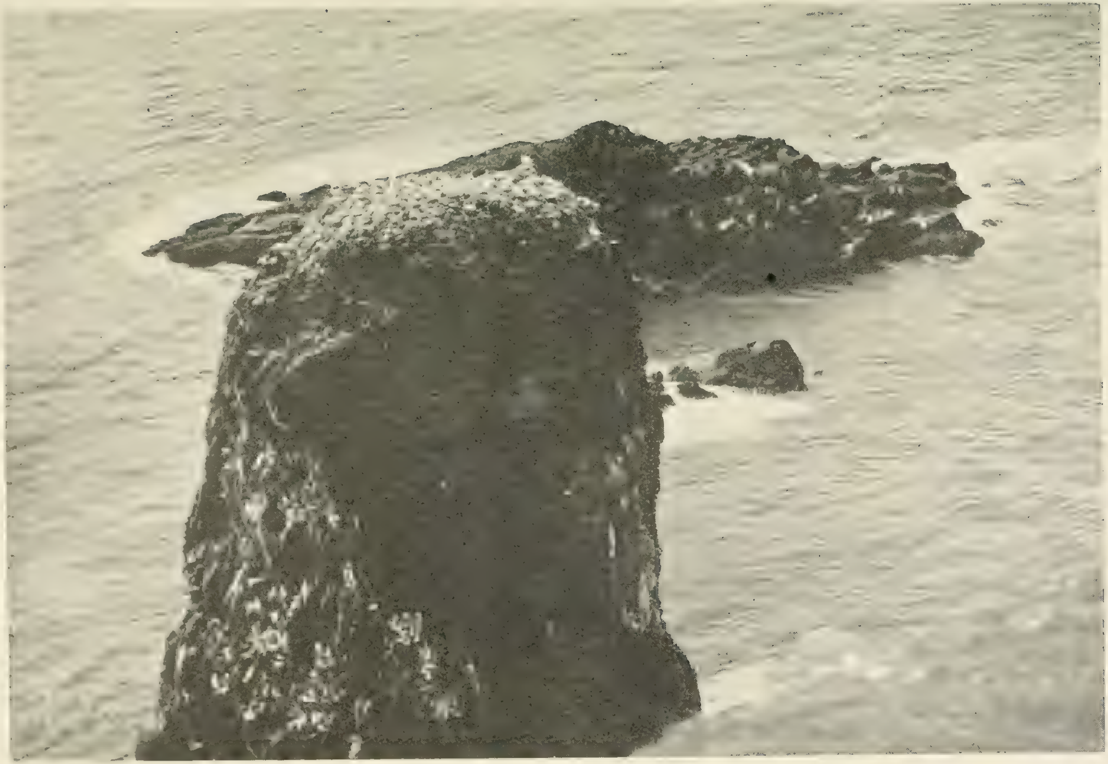
* Col. Feilden says $\frac{1}{4}$ mile Danish is about one mile English.

† No doubt a mistake, a single egg is laid, not two.



MYGGENÆS HOLM.

name of Graasula [Grey Solan]. They are very fat but pretty oily. The old are caught in the middle of April, when they have built their nests, but not yet laid eggs. It is at night, when it is dark, that the people steal upon them, where they sit and sleep, and with a sure grasp seize them so that they cannot utter any sound, for if that happened all would wake and fly away. The young are killed in autumn with a small stick or cudgel, which is called *Kadix*, when people are stationed in the sea in a boat, from which they both kill and pick them up as they fall down.* The catch is lucky when about 200 are taken in spring, and as many young. It is wonderful to see with what swiftness this bird can shoot down from the sky into the sea to catch Sild or Sej [herrings and coal-fish]. It goes quite under water and leaves much foam on the place where it has shot down. They have so wide a gullet that there is scarcely a Graa sej [coal-fish] so big that they cannot gulp it down whole."†

Modern History of Myggenæs Gannets.—As regards the more recent condition of the Gannets of the Færöes, I will commence by quoting a very good observer of birds, H. C. Müller (Sysselmand). "Færöernes Fuglefauna." *

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* What is probably meant here is that the men in the boat kill any which are already in the sea, besides picking up what are thrown down to them by those on the Holm.

† Mr. Harvie-Brown observes that coal-fish sometimes go up to 15 lb. and even 20 lb., so Landt's assertion must be understood with some limitation.

TRANSLATION BY PROFESSOR NEWTON.

"*Sula bassana* . . . considered to arrive on land on Polismessudag [St. Paul's Mass], 25th January, yet single birds may be seen flying throughout the whole winter. Solans breed and indeed dwell on no other place in the Færoes than Myggenæs holm and the two rocks Pujgarsdrengur and Fleåtidrengur standing close thereto. As an exception one may conclude that when they build their nests they collect the materials on the island of Myggenæs close to the Holm. Early in February a few Solans are seen by day on the north side of the Holm and the Drongs, but not by night. From Mariumessu [Ladyday] the 25th March, they are seen also by night, and they are then very fat, but become leaner towards the breeding time. Solans search about in all the fjords where there are Sei and Sild [coal-fish and herrings], on which they feed by plunging like a dart from the sky, eight or ten fathoms or more, and can sometimes be down for a minute before they come up again. They will often cram themselves so full of fish that they are not in a state to rise again from the water. Early in April they begin to build their nests, generally to build to an old nest, which is of the same material and solidity as a Kittiwake's, and laid in the same way on projecting knobs on the cliffs. The nest is nearly as high as a man's knees. On the 14th of April they lay one egg, which is like a Skarf's [Cormorant's], in proportion to the bird's size, and the shell overlaid with a peculiar calcareous coat. In general there are many nests close together, though Solans do not agree well, when they sit on their nest. They breed very unevenly, in that some young are ready to fly, while others are newly crept out of the eggs. The young are never ready to fly before the 8th of September. Until the 29th of September is the general time to take the young, but there are often many left behind after that day. When the young leave the nest the old fly with them. Sometimes one may see Solans sitting about the 14th October, and one sees them flying near the Holm until Advent. . . . . . .

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* Page 73. It is separately printed from "Videnskabelige Meddelser fra den Nat. Forening," 1862. Müller published a shorter article on the Gannet in "Journal für Ornithologie" (1869, p. 388). Müller's MS. annotated up to within a year of his death is in the possession of Mr. Harvie-Brown, to whom it was given by the author.

. . . .

The catch of the old Solans begins on the 25th March. (' Ojesulan,' that is Solans until 4 years old, sit first about Olai [St. Olave's day] 29th July.) For the catch to be very prosperous, they must go on it with a northerly wind and hailstorms, yet not with too much snow, by night with a moon in her wane. The catch proceeds in the following manner. One or two boats with the necessary crew betake themselves to the Holm, only a few fathoms distant from the island [Myggenæs] and carry with them one end of a line, of which the other end is made fast to the mainland so that thereby necessities can be hauled to the Holm in case the surf should hinder boats from landing again on the island. The crew divide into parties, provided with lines, according to the different ledges (?) of rock [literally 'rock-offsets'] on which the Solans breed. One party remain lowered 43 fathoms to a broad Rouk [Faröese word, Professor Newton supposes =rock] (ledge of rock or Hylla [Faröese word again]), whence again 3 of the parties are lowered down 30 fathoms further to other ledges of rock. It must be observed that the lowering should never happen to be over the Solans, for the small stones and gravel displaced by the lowering would awaken them. After the crews have come to the Solans' sleeping place, the catch proper begins. So soon as the fowler can distinguish the chalk-white birds he goes to them on the cliff and throws himself over them, so as to get as many as possible under him, in order that he may wring their necks. Sometimes a man can take 12 Solans at once. When it [the bird] gets hold with its beak of a man's clothes or any other object, it holds fast and never lets go before it is dead, which makes the catch easier ; but the man must take care of himself, that the birds should not get hold of his hands, for that would hinder him in his work.

"On Pujgarsdreng and Fleatidreng, of which the first is 30 and the second 20 fathoms high, the Solans sleep on the flat top. People climb these Drongs with the help of poles which are lifted up to the cliff, to the different places where foothold is to be got. and then others are hauled up to them. When they are come to the top of the Drong, four or six men steal along the edge on the Solans, and when they have surrounded them, they all at a given signal spring at once upon them and drive the Solans in a heap into the middle of the Drong, where they kill them. As many as 50 may be taken in one night on the Drongs. This proceeding is carried on every night so long as the weather keeps fine until the Solans' breeding-time. They commonly catch about 300 old Solans yearly. The catch of the young [Solans] goes on from the 8th to the 29th of September, and they are taken in the nest. They are commonly hit on the head with a bit of wood. One or two boats lie under the breeding place to pick up the young as they fall down. Of the young about 600 are taken yearly. The flesh of both old and young is salted down against the winter. The feathers are of little value, for they smell so strongly."

It will be observed that Svabo and Landt only give the annual take of Gannets as being in their time 200 old ones, and 200 young ones, whereas Müller says 300 old ones and 600 young ones, better appliances and greater skill being probably employed in taking them.

"The Birds of the Færoe Islands." By Capt. Henry W. Feilden. ("Zoologist," 1872, p. 3210.) Contains valuable notes on Gannets and other birds.

Colonel Feilden, to whose assistance I am greatly indebted, visited Myggenæs in June, 1872, and Mr. R. M. Barrington was there in 1892, the former saw the Gannets on the Holm where he could not land, but was able to count 136 on their nests.

I have not met with any subsequent account of these Gannets in English publications. In 1894 Mr. J. A. Harvie-Brown went to the Færöes and visited Myggenæs, and brought back valuable notes, and a series of photographs, one of the best of which I am permitted to reproduce.* In 1904 I was informed by Mr. Jens Olsen, of Thorshavn, with whom Mr. Harvie-Brown put me in communication, that the number of Gannets taken still kept up to about six hundred young ones, and three hundred old ones, the same figures as given by Müller, and that the young in down was still called an "Ompel."†

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* A good view of a part of the Holm and the Gannet "stacks" adjoining it will be found in "Proc. R.P.S.," Edinburgh, 1895 (Pl. II.).

† *See* p. 19.

Number of Gannets at Myggenæs.—Mr. Barrington estimated the Myggenæs Gannets at 1500 in 1892, and after consulting Mr. J. A. Harvie-Brown and Mr. Jens Olsen, I think that is as good a guess as is likely to be made. If 600 young ones were taken annually that would mean nearly 1200 parents, allowing that a few might breed twice, and some nests would be inaccessible.*

Iceland.

The Early History of its Gannets.—It might be expected that there would be occasional mentions of the Gannet in the "Saga" literature of Iceland, but I learn from Mr. Eirikr Magnússon that such is not the case. No periphrases, such as bring it into the Saxon Chronicle, occur in the ancient poems, nor are there any allusions to its name, so far as he is aware, in these legends of the north. Mr. Magnússon, however, gives me to understand that there is one early MS. in which the Gannet is referred to, and that is the "Eddubrot" (a fragment of the Snorra Edda)—Cod. membr. Arnamagnæ—

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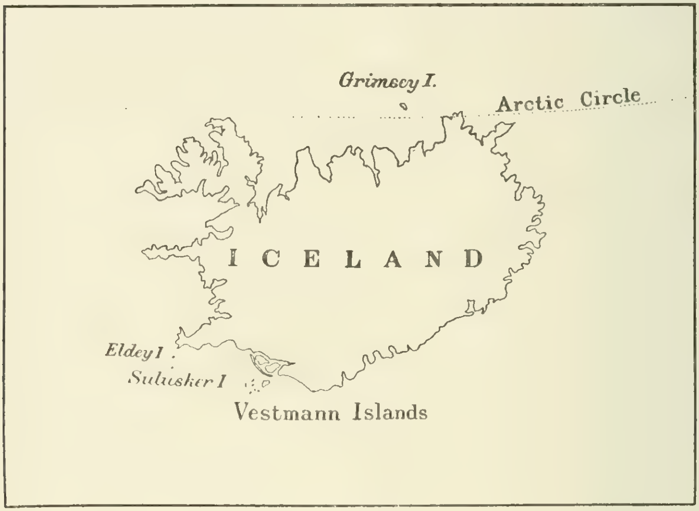
* In May, 1894, an Albatros (*Diomedea melanophrys*, B.) was shot on the Holm of Myggenæs while sitting among the Gannets ("R.P.S.," Edin., XIII., p. 92); it was believed to have spent many summers with these Gannets, and was even locally known as the "Sulkonge" or Gannet King The reason given to Mr. Harvie-Brown for shooting it, was that it acted as a sentinel, and prevented the Myggenæs men from getting their required tale of Gannets ("Zoologist," 1894, p. 337).

anus 748 4°—of which the date would run from about A.D. 1400, certainly not later.* From him I learn that there are recorded in this curious list the names of two hundred and three birds, which were known to the compiler of the so-called ókend heiti,† and among these names‡ we have svǫrr, storkr, and svla (*i.e.*, súla), which last is the name of the bird which now goes under the designation of


Grimsey I.
Arctic Circle
ICELAND
Eldey I.
Sulusker I
Vestmann Islands

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* Edited in the Arnamagnean edition of Snorris' "Edda," II., pp. 397-494.

† *i.e.*, plain appellatives for a great variety of animals and inanimate objects, but apparently not all necessarily inhabitants of Iceland.

‡ "Fuglaheiti," p. 489.

Haf-súla,—that is, the Gannet. Mr. Magnússon, who has been most kind in the assistance he has rendered, also writes:—"From 'Diplomatarium Icelandicum' I find that Súlna-höfn (harbour) is mentioned in a charter of 1270, Súlna-hamar (crag) 1270, and Súlna-stapi (stand-rock) 1327. Súlna gen. plur. of súla can, of course, mean basaltic columns, but it can also refer to the bird."*

For much general information about the Icelandic homes of the Gannet, concerning which we know nothing prior to 1752, although there may be Icelandic writings of earlier date which refer to them, I am indebted to the late Professor Newton, who visited Iceland with John Wolley. I may premise that the careful translations of passages to be quoted from the works of Olafsen and Polsen and Mohr are by his hand, but not the translation from Faber's "Prodromus," but all three are, I believe, new to English readers.† Thanks are also due to Mr. P. Nielsen and Mr. O. Ottosson for some help.

1. Olafsen (Eggert) and Povelsen (Biarne). "Reise igiennem Island" [Travels through Iceland, 1752–58], 1772, Vols. I., II.

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* Súlna-stapi is on the north-west coast of Iceland, Súlna-hamar and Súlna-höfn on the north-east.

† Horrebow's "Natural History of Iceland" (1752, English edition, 1758) contains nothing about the Gannet.

TRANSLATION BY PROFESSOR NEWTON.

“. . . . The Hafsula commonly comes to the Sonderland* early in spring; otherwise it has no certain time, for it follows the Sild and other small fishes which make for the shore in shoals: the Cod also seeks these fishes and therefore the inhabitants hold the Hafsula for a good and lucky fowl, which always brings tidings of fish. In the spring of the year when the Sild (by which term is understood not only the true Herrings, which in Iceland are called Havsild, and do not come every year, but also all kinds of small sea fishes, such as the Kopsild, *Clupea lata quadruncialis*, the Lodnu Sild, *Clupea villosa fœtens*, and others) run into the Hvalfiord, the Hafsula follow after them and are caught at Akrenæs in two ways: First in the spring nights [Vaarnætterne] when they sit and sleep on the sea keeping their head under one wing, continually working with their feet to keep the body balanced. It is very pretty for strangers to see how these white bundles drift before wind and tide on the sea, as one cannot know what they are until one comes near to them, for the bird, which is tired with its day’s work and satiated besides, does not wake from its sleep before one gives the alarm. Besides Nature has taught them the precaution not to sleep except where they can find room enough to drift on the sea so that they shall not strike the land. The inhabitants then row to those places either solely for the sake of the bird or to fish at the same time: they move the oars softly along, so that they shall not awaken the bird, and it is struck with a 'blooy' on the head, rowing thus backwards and forwards where any Hafsula are seen to drift; they always try to hit the head or the neck so that they may thereupon wring it. The second occasion when one looks out for Hafsula is when they are hunting after Sild, for the bird is wont to fly high over the water and look for them, as it has very sharp sight and when up in the air it perceives a shoal of Sild, it at the same instant falls or shoots like an arrow into the sea, often by many hundreds close to each other. If this happens near the land, and there should not be depth enough, but the bird strikes on a rock, it unfailingly breaks its long neck and comes to the surface dead. Under the water the Hafsula catches and swallows as many small fish as it can find room for, so that when it comes up again after a couple of minutes it is quite heavy and sluggish, so that it cannot fly. The hunters thereupon row to it in haste while the bird is under water, for it is not afraid to shoot down a short distance from the boats, since it is both hungry and greedy; and when the Hafsula come up, as many as can be got are killed in the way above mentioned, by rowing backwards and forwards, for the birds must at last come up to take breath. Hafsula gives a great mass of feathers, and the flesh is eaten, for it is bravely fat and rich, but on that account oily (as they say). Its chief resorts in Iceland for bringing out its young are the Fugleskiær, six miles to the south of Reykenæs, and Sulukletteſr, a rock among the Westman Islands." In §832, as pointed out by Mr. Magnússon, the account is slightly different :—"The Hafsula builds nowhere in the country except here [in Westmann Islands], on a separate rock called Sulu-skær. The young Hafsulur are caught and eaten by the inhabitants, but their flesh is oily and therefore not so palatable to foreigners; yet when the skin has been removed that taste disappears for the most part, as is also the case with other oily sea-birds."

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* South part of Iceland.

The above, though written one hundred and forty years ago, conveys a faithful description of the habits of the "Hafsula" or Gannet. This word, literally meaning the Solan of the Sea, has been the Icelander's name for it from early times, but at the present day Mr. Slater says it is more often called simply Sula.* In Norwegian and Danish the spelling is "Havsula."

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* *See* "Manual of the Birds of Iceland," 1901, p. 37, and "Ornis," 1887, pp. 594, 609.

2. Mohr (N.). "Forsög til en Islandsk Naturhistorie." (1786.) p. 34.

TRANSLATION BY PROFESSOR NEWTON.

". . . . . Hafsula. In the north of the country it is sometimes seen to fly into the fjords. The inhabitants thereupon expect hard weather, but they do not stay there long, for so soon as the Eagle is aware of it, it pursues them so long that they either become its prey or escape out to sea again. The young are grey the first year, and are said to have a very good flavour, on which account this bird is highly valued in Scotland and is eaten as a great delicacy by the higher classes there. It is called Jan van Gent by seamen. More about this bird can be read in E. Olafsen's 'Travels' (pages 223 and 556), as well as in Ström, Brünnich, and others."

Mohr is the only author who speaks of Gannets being attacked by Eagles, except Macgillivray, and he only gives one somewhat inconclusive instance.*

3. Faber (Friedrick). "Prodromus der Isländischen Ornithologie." (1822.) pp. 84-87.

TRANSLATION.

"(1.) S. alba (Meyer) Isl: Sula, Hafsúla. A non-migratory bird more frequent in the South than in the

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* *See* "British Birds," V., p. 14.

North. Their breeding places are always small islands and rocks in the sea, some distance from Iceland itself: among these the most remarkable are: Grimsöe, the Bird-rocks* and some of the Westmanöer. They come towards the end of April to these cliffs. On the surface of the latter, rarely in the sides of the rocks, they build in company their large nests, which consist of seaweed and are always wet. I have often seen them hunting for *Fucus digitatus* two miles from their breeding place, whither they carry it in their beaks. The mother bird lays in the middle of May, never more than one egg in her nest. In proportion to the size of the bird it is small, almost smaller than that of *Pr. glacialis*,† bluish-white, but with a yellowish-white calcareous shell; when it has been sat upon for a long time it becomes a dirty yellowish-brown,—as has been said with regard to *Podiceps*, from the dampness of the nest. The young bird is hatched in the very beginning of July and is then quite bare and very small; at the end of July it is half-grown, and covered with short yellowish-white down. In 1821 I was at this time of the year on the Westmanöer and climbed the small rocky island and found these birds together with their brood. Young and old shrieked discordantly at sight of me—their sole note a deep hard o-r-r-r, but they did not move from their position, so that I was able to take with my hands as many of the old birds and their young as I wished. The nests lay close together and the soil was so slippery that I ran the risk of being precipitated down the slanting cliff, partly on account of the dirty nests, partly because of the quantities of disgorged *Clupea harengus*, *Sepia loligo*, etc., etc., which the attentive parent birds had deposited in the nests in the process of feeding their young. It is remarkable that nearly a third of the nests contained addled eggs, which were nevertheless being sat upon by the parent birds, who, misled by the impulse to feed their young, expected at this time of the year, had disgorged food in front of the nests containing addled eggs as well as before those containing young birds.* The bird obtains this food by means of his highly developed diving apparatus. Raising himself high into the air he precipitates himself under water like an arrow and to a fair depth perpendicularly as well as in a slanting direction, which the other genera are not able to do. For me it was one of the most interesting ornithological sights of my whole journey to see *S. alba* uninterruptedly, and in flocks, fish in the bays of Westmanöer. They prefer to fish in still water, but I have also seen them throw themselves into the breakers. When they have filled their gullets, they fly in measured flight to their young. They fly more quickly than seagulls and often with an undulating flight like the stork. At the end of August,—on Grimsoe not until Michaelmas,—the young are fully feathered and almost as large and much fatter than the old birds. The inhabitants then capture as many as they can and salt them down. While in the nest their feathers are black, with separate white spots. This colouring passes gradually into yellowish white, first on the head, neck, breast and underside of the body, next on the back and smaller (covert) feathers of the wing and tail, and finally on the middle tail feathers and the larger inner wing feathers (quills). In the fourth summer (including, as always, the year of birth), the bird is mature and in full feather. In the beginning of October, young and old disappear from the birth- and breeding-places and remain throughout the winter on the coast, by the open sea. With their beaks tucked under their wings, they drift on the sea, sleeping so soundly that they are scarcely awakened by a ship sailing past. They are not only always greatly tormented by lice, especially in the nest, but are also sometimes attacked by an infectious disease which destroys countless numbers which drift, dead, on to the shore."

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* No doubt "Eldey" is here meant.

† *Procellaria glacialis*, the Fulmar Petrel.

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* It is more likely that this food had been intended for the sitting females, the young being fed at first from their parents' throats.

I have not elsewhere met with any account of Gannets dying from disease, but continued rough weather, by depriving them of food, may at times starve them,* as not infrequently happens in the case of Razorbills and Guillemots.†

Modern History. The Westmann Islands.—It will have been gathered that there are, and long have been, two Gannet settlements on the south coast of Iceland, which, though well-known to Icelanders, have been very rarely visited by any others; these are the Gannetry on the Westmann Islands (Vestmann Eyjar) and one on Eldey,‡ which is one of a group of islands known as the "Fuglasker" or "Fugleskiær." I am indebted to my relative, Mr. Eustace Gurney, who visited the Westmann Islands in 1898 with Mr. Nelson Annandale, and to what Mr. Annandale has himself written about Iceland,§ for all I can here say about the Westmann Isles Gannets. Mr. Gurney and Mr. Annandale landed on Sulusker (*i.e.*, Solan's Skerry),* one of the outermost of the Westmann group, on September 10th, with a party of four men in quest of the young Gannets, which are considered ripe when the black appears in their wings.† My relative tells me the height of Sulusker, where the Gannets breed, is about three hundred feet, and before undertaking the climb to its summit the leader of the party offers up

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* Of which an instance is given in "Ornithologie Européenne," par C. D. Degland et Z. Gerbe (1867), II., p. 348.

† *See* "Proc. Nat. Hist. Soc., Glasgow," I., pp. 2, 4, and Shepherd's "North-West Peninsula of Iceland," pp. 42, 77.

‡ In Danish "Melsækken"—Anglice, mealsack—from the whiteness caused by the birds' excreta on the island. A good deal of information about Eldey, in connection with the Great Auk, is given in the "Ibis" (1861, p. 374), and "Natural History Review" (October, 1865): it is only thirteen miles from the mainland.

§ In the "Field Naturalist's Quarterly," (1904, p. 24,) and in "The Færoes and Iceland" (1905), p. 121.

YOUNG GANNETS BEING DRIVEN. [*E. Gurney.*

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* The same referred to by Olafsen as Sulukletter.

† At the Bass Rock they would have reached this stage by the third week of August: at the Westmann Islands Mr. Nielsen informs me Gannets only begin to lay about the 10th of April

a prayer for a safe ascent, and when the top is reached anyone who is then ascending it for the first time is solicited to deposit a small coin in the cairn there. These rites completed, the men fall to slaying the young Gannets, which offer no resistance, with heavy clubs. On this occasion 562 young Gannets were procured, viz. :—

GANNETS BEING DRIVEN. [E. Gurney.

440 on Sulusker.
60 on Geldingasker.
62 on Brandten (Brandt).

all three adjoining islands; and Mr. Gurney obtained a series of photographs, with which he has obliged me,* some of them taken while the young Gannets were being driven preparatory to their slaughter. He learnt from the men that the value to them of a young Gannet was 35 ore (= 4½d.), but the feathers were of no value.

I have spelled the names of these islands in accordance with the Admiralty Chart of 1897 ; two of them at any rate are the same islands as Faber speaks of—Brandten or Brandt,† and Sulusker, but Professor Newton considered Geldingasker to be distinct from, though near to, Geirfuglasker.‡ Professor Newton supplied the references, and also a map of the islands, taken from the steamer in which he passed them, but at some distance.

Eldey Island.—Hjalti Jónssön, the master of an Icelandic fishing vessel, who has ascended the steep stack called Eldey, has told my obliging correspondent Mr. P. Nielsen, of Eyrarbakka, that when he was there it was quite covered with Gannets' nests. This is the same Jónssön who took two of the eggs in the late Professor Newton's collection.§ Jónssön says the Gannets are far more numerous here than on the Westmann Islands. In 1879 he thought there might be 20,000 Gannets on Eldey, but in 1904, wishing to be cautious, he told Mr. Nielsen that 6,000 or 8,000 was perhaps enough.* However, there must be more than that, for another authority, Mr. G. J. Johnss,† in answer to an inquiry for information on the subject, tells me that the annual take of Gannets on Eldey Island at the present time (1908) is

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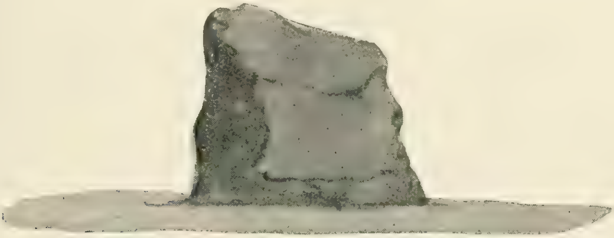
* Nine days after his visit about 3,000 Fulmar Petrels were taken, and the total for the year 1898 was over 24,229 Fulmars (Annandale, *t.c.*)

† "Isis," 1824, p. 790.

‡ "Isis," 1826, p. 710.

§ *See* "Ootheca Wolleyana," II., p. 458.



Eldey bearing S.W. by W.
27 July 1858

about 4,100, and it may even have been more formerly. No English naturalist has landed on Eldey that I am aware of. Professor Newton passed near it in 1858, after spending nearly two months with Wolley, waiting for a favourable opportunity to land, and he then did the accompanying sketch; he could make no count but noted that the whole of the surface of the rock appeared to be white with Gannets, or their excreta.*

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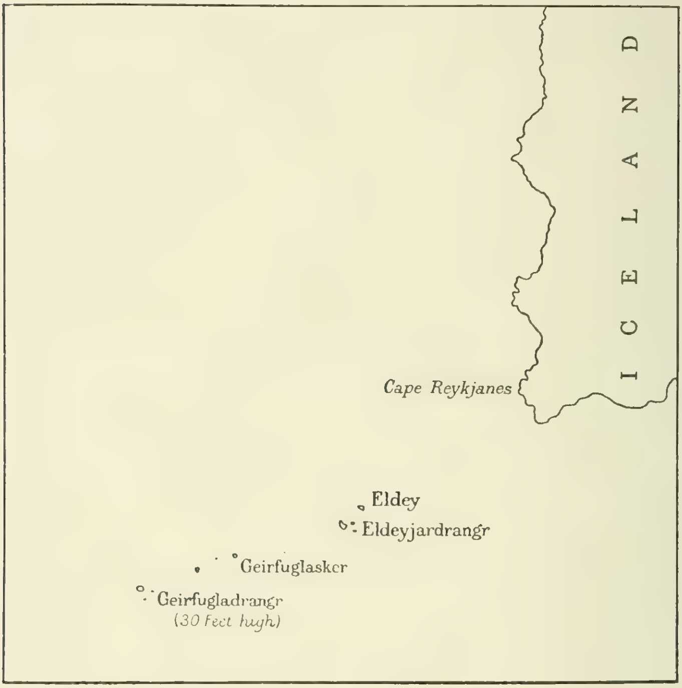
* He seems to have been very uncertain about it, *see* "Ooth. Woll.," II., p. 458.

† Acting British Consul for the Westmann Islands, 1909.


ICELAND
Cape Reykjanes
Eldey
Eldeyjardrangr
Geirfuglasker
Geirfugladrangr
(30 Feet high)

Grimsey.—Beside the Gannetries at Eldey and the Westmanns, there is another small one at Grimsey Island, which is possibly of long standing, though Olafsen makes no mention of it. The following was taken by the late Professor Newton from Friedrick Faber's Journal, 1819–21, which is preserved at Copenhagen.

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* *See* “Iceland: Its Scenes and Sagas,” by S. Baring-Gould (1863), App.

TRANSLATION OF FABER'S JOURNAL. PART I., P. 76.

"Aves in Grimson [Grimsey Island] . . . .(1819). . . , *Pelecanus bassanus* seldom, about 10 pairs are seen in the sea-skerries. Comes first in May, breeds first in June, goes away in August. . . . On Grimsey [itself] only three [pairs] breed ; but ten or twelve on an isolated rock standing in the sea close by, and one sees their long necks upon the flat top of the rock."

Grimsey is the most northern breeding haunt of the Gannet, which is probably the reason why they arrive thus late and depart so early. Professor Newton was informed by Mr. Bernhard Hantzsch, who visited Grimsey in 1903, and has since published his experiences,* that the Gannets have increased five-fold since Faber's time, there being, when he was there, from fifty to sixty pairs.

The presence of other communities of Gannets has been suspected on the west coast of Iceland, for though Faber says there were but three stations in his time,* others may have sprung up, *see* Mr. Slater's remarks.† Mr. Nielsen was informed that some bred on Drangey on the north-east of Iceland, but afterwards had reason to doubt it.‡

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* "Vogelwelt Islands," von Bernhard Hantzsch. In this work, which describes one hundred and twenty birds, there is a good photograph of the Gannets' cliff. *See* also "Die Vogelinsel Grimsey (Nord-Island)," 1904, by the same author.

In the table to be given presently I propose to reckon Eldey and the Geirfugladrangr together at 9,500 Gannets, the settlement on the Westmann Islands at 4,000, and Grimsey at 100; of course, freely admitting that these figures are open to amendment.

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* "Isis," 1826, p. 710.

† "Birds of Iceland," p. 37.

‡ P. N., *in litt.*, February, 1905.

CHAPTER IX.

GANNETS ON THE COAST OF CANADA.

Gannets in Canada—Jacques Cartier's discovery of their breeding-place—Modern history of the Bird Rocks—of Bonaventure—Estimated numbers at these places—Great Manan and Perroquet abandoned by Gannets.

Early History of the Canadian Gannets.—The Gannet of North America was separated by Bonaparte from the European Gannet in 1838, under the name of *Sula americana*,* but this decision has not been upheld by the judgment of modern ornithologists on either side of the Atlantic, and accordingly they are here treated as being the same. Much persecution seems to have been meted out in the past to Canadian Gannets, in part because they were found by the fishermen to be of use for fish-bait, in part from the prevalent idea that where there are many Gannets and other kindred sea-birds, there will be fewer fish for human beings.† So rampant had been the spirit of destruction towards the middle of the last century, that the late Professor Newton when writing that most accurate and up-to-date work, his "Dictionary of Birds," in 1892, considered that there was every chance of the species ceasing to breed at all on the western side of the Atlantic—four of their settlements being extinct already—if something was not done to protect them.* Happily such a disaster as that was averted, and the Gannets have maintained their hold in two places in the Gulf of St. Lawrence—Bird Rock, twenty miles north of the Magdalen Islands and Bonaventure Island in Mal Bay, Gaspé. Here there are still strong settlements, and I think we may say increasing ones. The map shows the positions of these islands, which, being

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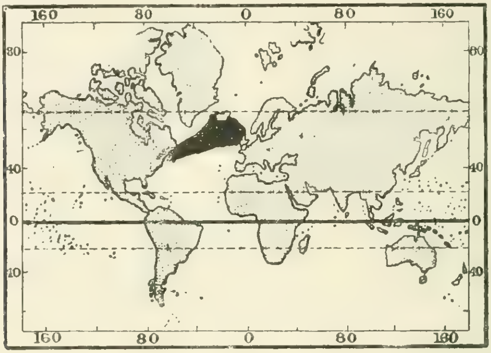
* *See* p. 3. In 1828 he had treated them as the same in "Annals of The Lyceum of Nat. Hist. of New York" (ii., p. 408).

† A theory already combated in the Introduction, p. 6.



AREA OF THE DISTRIBUTION OF THE GANNET IN SUMMER IN THE NORTH ATLANTIC (MARKED BLACK).

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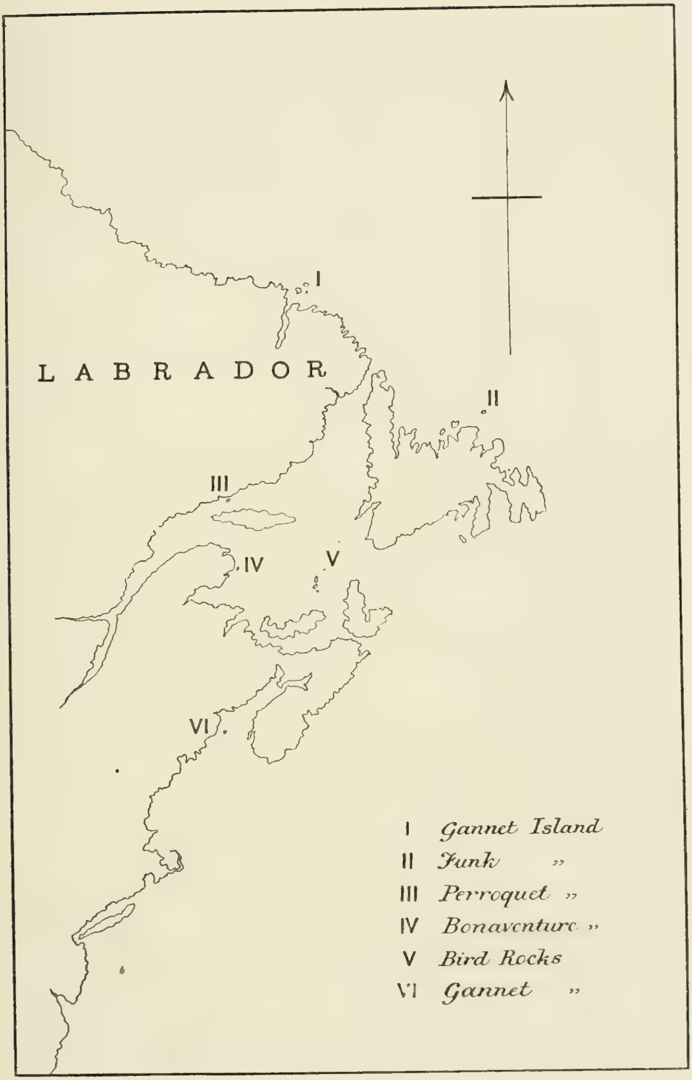
* "Dictionary of Birds," p. 301.


I
II
III
IV
V
VI
LABRADOR
I Gannet Island
II Funk ”
III Perroquet ”
IV Bonaventure ”
V Bird Rocks
VI Gannet ”

the only non-European haunts of *Sula bassana*, have on that account an especial interest, and also because of their geographical position, for they are much more southerly than any of the Gannet stations of Europe. In the matter of temperature, however, there is, I believe, not a great deal of difference.

The earliest record of the Canadian Gannets known to naturalists, is contained in the log of an adventurous French navigator, the famous Jacques Cartier, who in 1534 sailed from France for the New World. On the 10th of May this intrepid sailor sighted the coast of Newfoundland, which had been discovered some thirty-seven years before by Cabot, and on the 21st he reached an island which could have been none other than Funk Island. Thanks to the late Professor Newton, I have been able to make use of Cartier's original narrative, which is in Breton French, Cartier having been a native of Brittany.*†

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* Cartier's portrait still hangs in the Town Hall of St. Malo.

† "The first relation of Jacques Cartier" as contained in "The Principal Navigations, Voyages, Traffiques and Discoveries of the English Nation," by Richard Hakluyt (1589). Hakluyt, in Professor Newton's opinion, translated from the version by Ramusio, who was the first to publish any account of Cartier's first voyage, which he did at Venice in 1565. What is called, adds Professor Newton, the "Relation originale," supposed to be in Cartier's own words, if not handwriting, was published at Paris in 1867, having been discovered shortly before. A good modern edition of Hakluyt's Voyages was brought out by Maclehose and Sons, publishers to Glasgow University, in 1904, which I have used.

"L'isle des Ouaiseaulx [Oiseaux].*

. . . . . .

"Il y en avoit d'aultre plus grans, qui sont blans, qui se mettent à part des aultres en vne partie de l'isle, qui sont fort mauuaiz a assallir ; car ilz mordent comme chiens et sont nommez *Margaulx*," etc.

TRANSLATION AFTER HAKLUYT.

"Upon the 21 of May [1534] . . . we came to the Island of Birds, which was environed about with a banke of ice, but broken and crackt : notwithstanding the sayd banke, our two boats went thither to take in some birds, whereof there is such plenty, that unlesse a man did see them, he would thinke it an incredible thing : for albeit the Island (which containeth about a league in circuit) be so full of them, that they seeme to have bene brought thither, and sowed for the nonce, yet are there an hundred folde as many hovering about it as within ; some of the which are as big as jayes, black and white, with beaks like unto crowes : they lie always upon the sea ; they cannot flie very high, because their wings are so little, and no bigger than halfe ones hand, yet do they flie as swiftly as any birds of the aire levell to the water ; they are also exceeding fat ; we named them Aporath.† . . .

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* I have not quoted the whole passage in the French.

† Probably the Razorbill (*Alca torda*, L.).

" . . . There are other larger birds, which are white, which live apart from the others in one part of the island, which are very bad to attack, for they bite like dogs, and are named *Margaulx*."*

No more of the passage is about Gannets, but the journal goes on to relate how Cartier's sailors found a bear "great as any cow, and as white as any swan, who in their presence lept into the sea," but eventually they "by main strength tooke her, whose flesh was as good to be eaten as the flesh of a calfe of two yeres olde." !

No doubt Mr. F. Lucas is right in thinking that this Island of Birds must have been Funk Island, Newfoundland,† for the context seems to preclude its being Bonaventure, in confirmation of which it may be remarked that the map shows a promontory marked "Gannet-Head" on the south point of Funk Island.‡ From Funk Island to Bird Rocks would be about four hundred miles. If one may credit the testimony of the fishermen, adds Mr. Lucas, some Gannets were breeding on Funk Island so recently as about 1857, but there are none now. It evidently was not a large settlement in 1534.

* "Margot" of which "Margaulx" (in the Ramusio edition it reads "Margaux") is the old plural, is still a fisherman's name for the Gannet on the north coast of France; in the neighbourhood of Boulogne it is seldom that any other appellation is applied to the Gannet. *See* p. 18.

† "The Auk," 1888, p. 135.

‡ *See* "Report Nat. Mus., 1887-8," Pl. LXXI.

The second passage in Cartier's entertaining journal, dated about a month later, runs as follows —

"Le landemain, XXV^{e} jour . . . fymes courrir au Surouaist quinze lieues, et vynmes trouver trois isles, dont y en auoit deux petittes et acorez comme murailles, tellement que possible n'est de monter dessurs. Entre lesquelles y a vng petit forillon ; Icelles isles aussi plaines de ouaiseaux que vng pré de herbe, qui heirent au dedans d'icelles isles, dont la plus grande estoit plaine de *Margaulx* qui sont blancs et plus grans que ouays ; Et en l'autre y en auoit paroillement en vne quantité d'elle, et en l'autre plaine de *Godez*, et au bas y auoit paroillement desdits *Godez* et des grans *Apponatz* qui sont paroilz de ceulx de l'isle dont est cy dauant faict mencion. Nous descendisme au bas de la plus petitte et tuames de *Godez* et de *Apponatz* plus de mille ; et en prinmes en noz barques ce que nous en voullumes."

TRANSLATION AFTER HAKLUYT.

"The 25 of the moneth [June 1534] . . . wee went southeast, about 15 leagues, and came to three Ilands, two of which are as steepe and upright as any wall, so that it was not possible to climbe them : and betweene them there is a little rocke. These Ilands were as full of birds, as any field or medow is of grasse, which there do make their nestes : and in the greatest of them, there was a great and infinite

number of those that wee cal Margaulx, that are white, and bigger than any geese, which [*i.e.*, the islands] were seuered in one part. In the other were onely Godetz [Guillemots and Razorbills] and great Apponatz [the Great Auk],* like to those of that Iland that we aboue haue mentioned : we went downe to the lowest part of the least Iland, where we killed aboue a thousand of those Godetz, and Apponatz. We put into our boates so many of them as we pleased, for in lesse than one houre we might have filled thirtie such boats of them : we named them the Ilands of Margaulx."

The identity of these three islands with what are now known as the Bird Rocks is sufficiently established ; their position, about the centre of the Gulf of St. Lawrence, is shown on the map, and they are still the home of the Gannet, as they were in Cartier's time. His expressive phrase "plaine de *Margaulx*" shows that he found plenty of them when he was there. It has been suggested by Mr. F. M. Chapman that a search among the narratives of other early voyagers might yield something of interest, but the only thing that I have come across about Gannets is that among the birds of Newfoundland, named by Sir Humfrey Gilbert, the step-brother of Ralegh, who made a voyage to those regions in 1583,* we find enumerated "A great white foule called of some a Gaunt"—doubtless the Gannet, but there is nothing about their nesting.

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* *See* Miss F. P. Hardy [Mrs. Eckstorm] on the identification of these birds' names, "The Auk," 1888, p. 382.

Modern History. The Bird Rocks.—Coming now to modern times, the celebrated Bird Rocks are the first settlement to be considered. Mr. F. M. Chapman, in a very interesting narrative of his visit there, terms the Great Bird Rock, which is 105 feet high, and which Cartier called the Island of Margaulx, "an ideal refuge for sea-fowl." In spite of the great diminution which history shows to have taken place in its feathered population, it is difficult, observes Mr. Chapman, for a casual observer to believe that it could ever have been more densely inhabited than it is now.† That is with the exception of the upper surface, where the lighthouse buildings are, and where no Gannets breed any longer. Of recent years Bird Rock has been visited by several good observers, one of whom, Mr. H. K. Job, author of "Wild Wings," was there in June, 1904, and it is satisfactory to learn that owing to a partial prohibition of shooting, most of the birds showed a decided increase since his previous visit to Bird Rock in 1900—an increase also noticed by Mr. A. C. Bent. It is to be hoped that for both the Canadian breeding-places—Bird Rock and Bonaventure—we may look forward to still further prosperity, now that the attention of the High Commissioner of Canada has been drawn to them. In 1881 Mr. Brewster complained much of the negligence of the Government in the matter, and with reason.*

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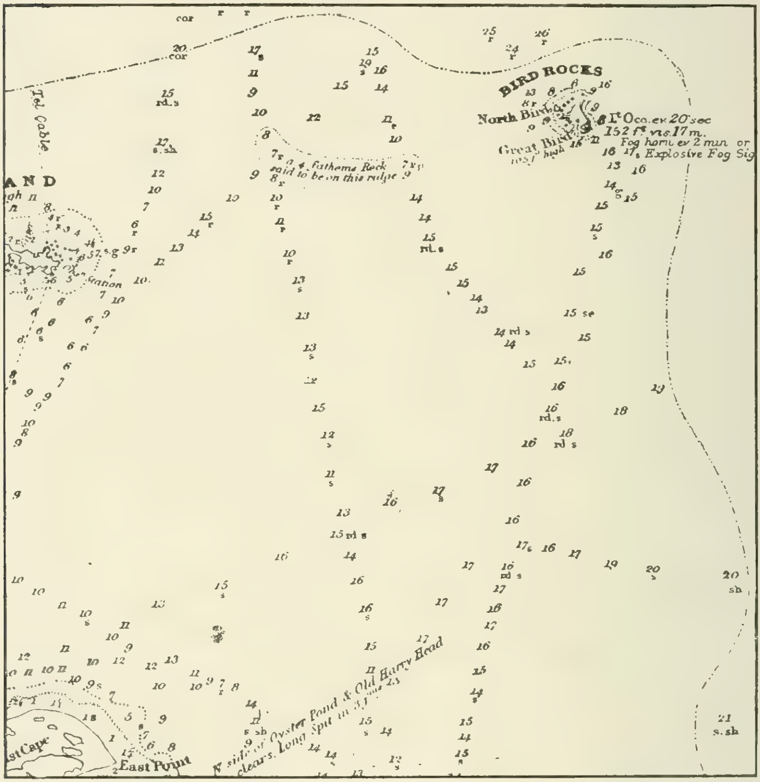
* *See* "Hakluyt," iii., p. 195, or in Maclehose's edition, viii., p. 59.

† "Bird Studies with a Camera" (1900), pp. 152, 161.


BIRD ROCKS
North Bird
Great Bird
Lt Occ. ev 20 sec 152 ft vis. 17 m.
Fog horn ev 2 min or Explosive Fog Sig
4 fathoms Rock said to be on this ridge
Tel. Cable
AND
Station
East Point
N side of Oyster Pond & Old Harry Head clears Long Spit in 3

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* Miss L. Gardiner, Secretary to the Royal Society for the Protection of Birds, learns on enquiry that up to October, 1909, there had been no general order of protection issued for the Magdalen Islands, of which Bird Rock forms a part, other than for game or wild duck, except that Loons and Gulls have a close time from March 1st to September 1st.

From the time of Cartier to Nuttall's "Manual of the Ornithology of the United States and of Canada" (1832–1834), there does not appear to be any mention of these Gannets on Bird Rocks, and Nuttall's information was derived from Audubon.* The cruise of this great naturalist-painter to the Bird Rocks in June, 1833, is an historic event

F. M. Chapman, Phot.

BIRD ROCK FROM S.W.

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* Nuttall, *t. c.*, ii., p. 498. Professor Verrill has seen an earlier account, but cannot recall where.

in ornithology. Although he did not himself actually land upon them, he was at any rate the first naturalist to gaze on the great bird hive, and see the seven species of sea-birds which bred there. The freshness which memoranda written on the spot always possess makes his Labrador journal*—which was not printed until long after his death, and in which all particulars of the expedition in the schooner "Ripley" are narrated—even better reading than the account in his subsequently published "Ornithological Biography."†

Another good account of Bird Rocks, and their Gannets and other sea-fowl, is that by Dr. Henry Bryant, who is entitled to the credit of being the first naturalist to land upon them.‡ His visit was paid in 1860, twenty-seven years after Audubon's, and he, amazed at the number of the Gannets, thought that there might be 150,000 of them, which was probably reckoning far too many. He writes: "The northerly or highest half of the summit of Gannet Rock, and all the ledges on its sides of sufficient width, the whole upper part of the pillar-like portion of the Little Bird, and the greater part of the remaining portion of this rock, were covered with the nests of the Gannet at the time of my visit. On the ledges the nests were arranged in single lines nearly or quite touching one another ; on the summit, at regular distances one from the other of about three feet. Those on the ledges were built entirely of sea-weed and other floating substances ; on the summit of the rock they were raised on cones, formed of earth or small stones, about ten inches in height, and eighteen in diameter, when first constructed, presenting at a short distance, the appearance of a well hilled potato field. I saw no nests built of Zostera, or grass, or sods ; the materials were almost entirely Fuci, though anything available was probably used ; in one case the whole nest was composed of straw, and in another the greater part of Manilla rope-yarn." In 1861 Bird Rock was visited by Professor Verrill.

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* "Audubon, and his Journals," by Maria R. Audubon and Elliott Coues (1898).

† Vol. IV., p. 222.

‡ *See* "Proc. Boston Soc. Nat. Hist.," VIII., p. 65.

We learn that in 1869 a lighthouse was erected on the flat summit of the large Bird Rock, and that the birds decreased in consequence. This was especially so on the table top of the rock, where the Gannets, which Bryant had estimated at 100,000 in 1860, soon began to disappear. "Hence," writes Mr. Chapman, "when Mr. C. J. Maynard visited the Rock in 1872, he found that the colony of Gannets on its summit contained only five thousand birds, which, nine years later, Mr. William Brewster reports had decreased to fifty pairs."* In 1887 Mr. F. A. Lucas, who visited the Bird Rocks in July of that year, tells us that no Gannets then bred on the Little Bird Rock, and only 150 on the Pillar Rock adjoining it, but that according to the lighthouse keeper, there were about 10,000 on Great Bird Rock.† When Mr. Chapman was there in 1898 he found Puffins

[F. M. Chapman, Phot.

GANNETS ON BIRD ROCK.

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* "Bird Studies with a Camera," p. 160. "Proc. Boston Soc. Nat. Hist.," (1883), p. 392. It was on July 4th that Mr. Brewster and Professor Hyatt landed. Mr. Maynard's narrative is published in "Town and Country" for 1879.

† "The Auk," 1888, p. 133.

and Petrels the only birds nesting on the summit of the Great Bird Rock. ". . . . not a single descendant of the one hundred thousand Gannets which, according to Bryant, occupied the top of the Rock in 1860 now being found there."* He assessed the Gannets on Great Bird Rock at perhaps only 1,500,† and those on the Little Bird Rock at 500, a sad falling off in regard to the former during eleven years

In 1900 Mr. Job went to Bird Rock, as already mentioned, and again in 1904, and on the second visit the number of Gannets might, in his opinion, be probably put at 2,000.

In the same year Bird Rock was visited by Mr. A. C. Bent, who has obliged me with the following notes from his memoranda‡:—

"June 24th, 1904. . . . They [the Gannets] are not now killed to any extent by the fishermen, very little egging is done, and only a very few are killed by the inhabitants of the Rock for food, hence they are very tame. Most of the birds nest on the west side of the Rock, fully two-thirds of them, about one-sixth on the two ends and only one-sixth on the whole east side, probably because most of the best ledges are on the west side, which are also the most inaccessible. I should say that the Gannets are the most abundant birds; certainly they are the largest and most conspicuous. The Kittiwakes make a close second. The Razorbills and the Brunnich's Murres are closely tied for third place. The Common Murres rank about fifth, the Puffins sixth and the Ringed Murres seventh. The Leach's Petrels would come in last, I suppose, though we saw very few burrows and not any birds. Assuming that there

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* "Bird Studies," p. 181.

† "Bird Studies," p. 183.

‡ *See* also his article in "Bird Lore" for 1908, p. 237.

[*A. C. Bent, Phot.*

GANNETS ON THEIR NESTS.

were 10,000 birds, they would be divided up about as follows :—

2,500	Gannets,
2,000	Kittiwakes,
1,800	Razorbills,
1,600	Brünnich's Murres,
1,400	Murres (*Uria troile*),
100	Ringed Murres,
600	Puffins.

" Practically all of the broader ledges were occupied by large nesting colonies of Gannets sitting as close as they could sit, often two or three rows deep, and many of the smaller or narrower ledges which were large enough to support their nests were occupied by them. They were decidedly the most conspicuous and striking features on the Rock, which may have led to our overestimating their abundance. Their nests varied greatly in size and style of construction, from practically nothing to well-made nests eighteen inches in diameter and five inches high. But as a rule they were fairly well made of fresh seaweed, kelp and rockweed, in many cases still wet, as if recently pulled up by the birds, but generally they were more or less dry. There were usually a few straws and feathers in and about the nests, and once a large piece of canoe birch-bark had been wrought in, probably as an ornament. There was always more or less filth about the nests, broken eggs, decaying fish and excrement, the ledges often being completely whitewashed with the latter. They have a curious habit of disgorging whatever fish they have recently eaten when they are disturbed and forced to fly away; they go through a series of preliminary motions, pumping their necks up and down, straining, gaping and retching until the fish is finally forced out of the mouth and deposited on the ledge near the nest, where it is left to decay or dry in the

[*A. C. Bent, Phot.*

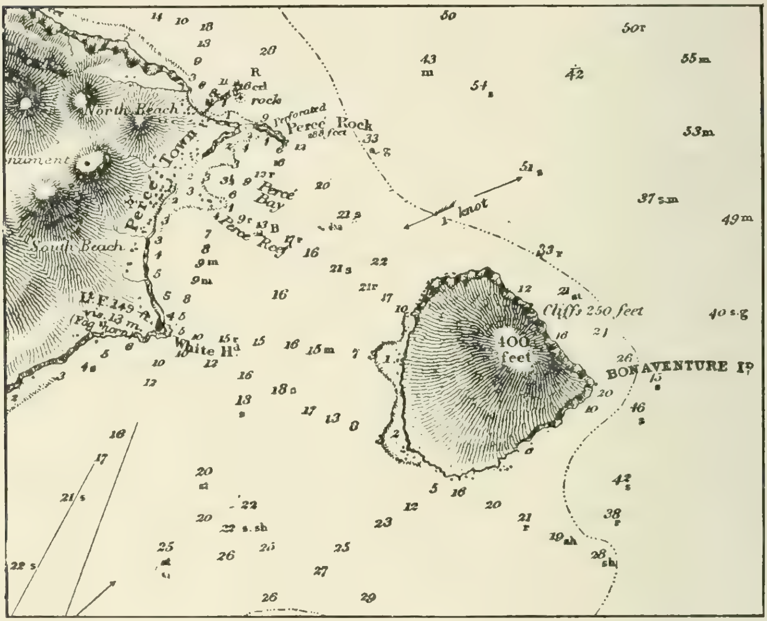
GANNET'S NESTS ON BIRD ROCK.

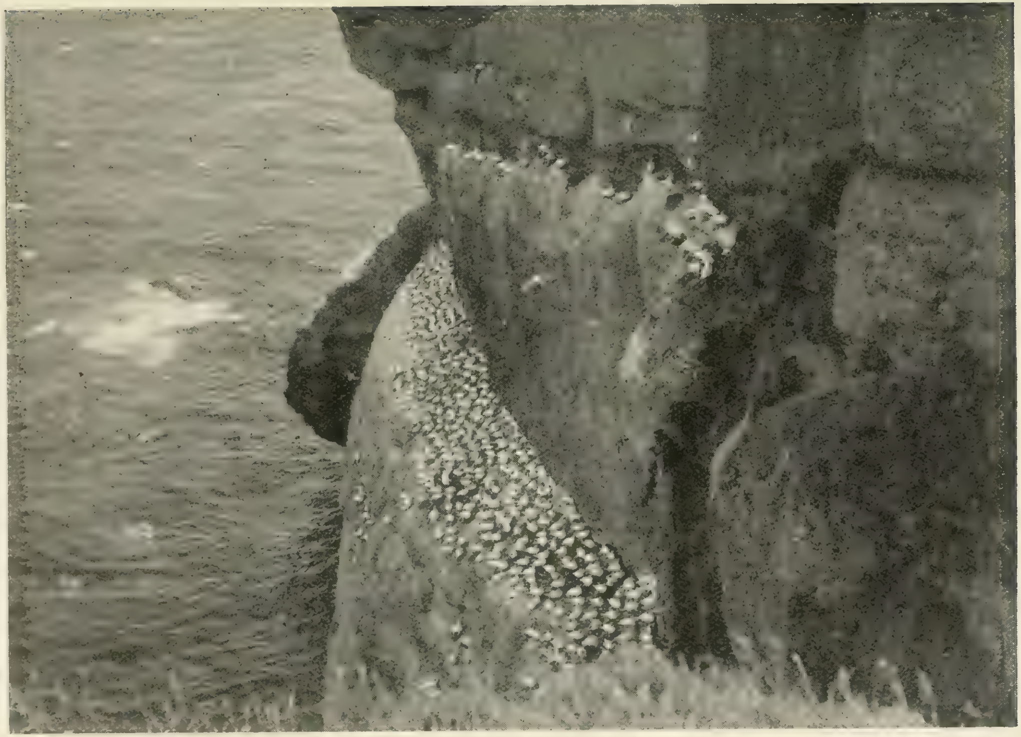
sun. These fish are often as much as a foot in length and generally partially digested. I could not make out whether this habit is caused by fright or by a desire to get rid of unnecessary weight ; probably the latter, as they are very docile and unsuspicious birds or very stupid and not easily frightened away. We had no difficulty in photographing them at short range, as they sat in their nests, craning their necks and staring at us stupidly, but if we came too near, the disgorging process would begin, they would move awkwardly away and gradually flop off over the edge of the cliff, uttering all the time a variety of loud guttural croaks and grunts, 'Kurrack,' 'Kurruck,' until they could spread their broad, black-tipped wings and sail gracefully out into space ; . . ."

The day following Mr. Bent rowed to North, or Little, Bird Rock, now consisting of two perpendicular stacks and a pinnacle, and found that the flat top of one of the former was covered with nesting Gannets. With this addition, therefore, the total Gannet population of the Bird Rocks may perhaps be as high as 3,000.

Bonaventure.—Audubon does not seem to have gone to Bonaventure, nor did Bryant visit it. The Gannets on that island were visited first by Mr. W. Brewster in 1881, although his party did not actually land, afterwards by Captain Collins in 1887, by the Rev. C. J.

Young in 1897, and by Mr. F. M. Chapman in July, 1898. They appear to have undergone a great deal of persecution, but in spite of it have recovered much of their former strength, so that in Mr. Chapman's opinion, this community may now number 7,000. I am much indebted to Mr. Chapman for a photograph of a ledge on the east side of Bonaventure, with about 400 Gannets on it, which can be seen through a magnifying glass to be nearly all facing towards the cliff; here they feel themselves in such security that all efforts on Mr. Chapman's part to startle them into


North Beach
nument
Percé Town
Red rock
Perforated Percé Rock 288 feet
Percé Bay
Percé Reef
South Beach
Lt. F. 149 ft. vis. 13 m. (Fog horn)
White Hd.
1 knot
Cliffs 250 feet
400 feet
BONAVENTURE Id.



[F. M. Chapman, Phot.

GANNETS ON BONAVENTURE.

flight were unsuccessful. Bonaventure is very precipitous on its north and east sides, with cliffs 250 feet in height. Its Gannets have, therefore, been tolerably secure from molestation, but Mr. Lucas doubts if their numbers were comparable to those on Bird Rock in its palmy days.*

Extinct Canadian Gannetries. Percé Rock.—From Professor A. E. Verrill, to whose assistance I am indebted, we learn that Gannets were breeding as recently as 1861 in large numbers on Percé Rock,† which he describes as perpendicular on all sides, and not to be ascended by any ordinary means. Percé Rock is close to the mainland, and a few miles only from Bonaventure ; there is a good plate of it in Chapman's "Bird Studies,"‡ but nothing is said about Gannets there, nor did Mr. Brewster find any in 1881. *Great Manan Island.*—Great Manan Gannet Rock is in Fundy Bay. In 1859 Mr. Verrill and Dr. Brewer visited this Gannet Rock and found only one or two pairs of Gannets nesting, but they were told there had been more before the building of the lighthouse. From this site persecution soon drove them away, although it was probably not entirely deserted until about 1866. At any rate, there were no Gannets left in 1873,§ and this is all the light, as far as Mr. Chapman knows, which investigations can throw on the date of their extinction ; most likely it was not at any time a large settlement. *Gannet Rock, near Yarmouth, Nova Scotia.*—In 1856 Dr. Henry Bryant found a hundred and fifty Gannets' nests here,* but I am not in possession of any later information about this settlement. A short quotation may be given. He says, "The number of brown [immature] birds was about one to three of the white, or adult birds. On scrambling to the summit of the rock, we found the nests ranged all round its borders, most numerous on the northern aspect, where they formed a continuous row ; they were very bulky, composed entirely of eel-grass, and were apparently used for more than one season, as several of them had been recently repaired." *Perroquet Island.*—The Gannet is believed to have entirely ceased breeding at Perroquet (*i.e.*, Puffin) Island, near Mingan, where in 1881 Mr. W. Brewster found several hundreds nesting† ; Mr. Lucas says that a few lingered as late as 1887, but their eggs were regularly taken.‡ *Shag Rock.*—In 1881 Mr. Brewster was informed of a few Gannets from Bird Rock having bred on Shag Rock, which is close to the Magdalen Islands, on the west side.§ *The Gannet Islands, Labrador.*—Some 400 miles north of Funk Island, and about ten from the mainland of Labrador, are three islands named the Gannet Islands and Gannet Rock—an appellation which may possibly signify that Gannets once bred there, but the names may have an entirely different origin. Professor Newton has pointed out that these islands are several times mentioned in a journal by George Cartwright,* but no hint is given of Gannets breeding upon them. Mr. W. Grenfell, who has often passed them, tells me that they reach to about 200 feet at the highest point. I am obliged to him and to Mr. McCrea for making inquiries, both as to the significance of the name, and as regards the birds themselves.

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* "The Auk," 1888, p. 134.

† "Proc. Boston Soc. Nat. Hist.," IX., p. 140.

‡ *T. c.*, p. 130.

§ *See* Herrick, "Bull. Essex Institute," V. (1873), p. 39.

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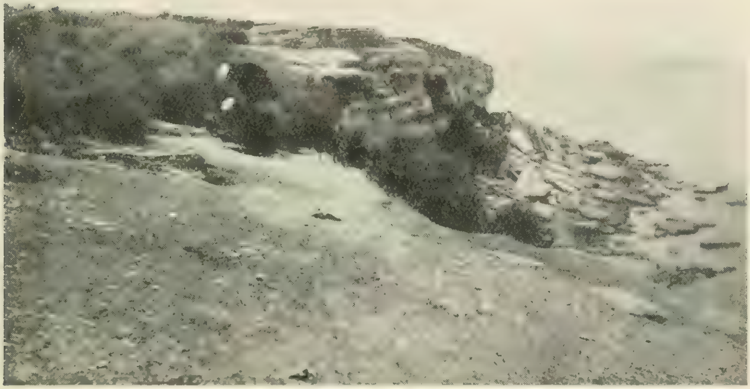
* "Proc. Boston Soc. Nat. Hist.," 1857, p. 119.

† "Proc. Boston Soc. Nat. Hist.," 1883, p. 393.

‡ "The Auk," 1888, p. 134.

§ *T. c.*, p. 391.



PERROQUET ISLAND, JULY 21ST, 1881.

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* "A Journal . . . . on the coast of Labrador." (Three Vols. 1792). *See* Vol. II., pp. 6, 224, 246, 247.

CHAPTER X.

ABANDONED BREEDING-PLACES.

Former Breeding-Places, no longer inhabited—Alleged Breeding-Places of the Gannet in England—in Scotland—in Ireland—on the coast of Canada.

Former Breeding-Places of Gannets.—None can fail to observe that sea-birds are very constant to the haunts they have once adopted, and this is emphatically true of the Gannet. But few changes have taken place—in historic times at any rate—in the nurseries of this home-abiding species, all of which, it will be remembered, are on islands. I think it may be said that but for the interference of man, in dispossessing the Gannets of some of their abodes, there would have been no abandonment of breeding-sites to record. Nor has any volcanic action ever dispossessed them of their island homes, as has happened once at least in the case of *Sula serrator*.*

England.—Judging from the "Itinerarium," or journal of the journey of William Botoner*—who is also known in history as William of Worcester—there must in the fifteenth century have been Gannets breeding on an island rock on the north coast of Cornwall, which at the present day goes by the name of "Gulland Rock." Botoner, whose journey seems on this occasion to have extended from Bristol to St. Michael's Mount on the French coast, after mentioning the islands of Edystone, St. Michael, and Ushand (Ushant), goes on to describe one called Pentybers, in these words :—

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* *See* Buller's "Birds of New Zealand," ii., p. 179.

"Pentybers-rok, maximus scopulus, in aqua Severn scita ex parte occidentali portus de Padistow ac castri Tyntagelle per 4 miliaria, et distat a firma terra per unum miliare, et ibi nidificant aves vocatæ ganettys, gullys, see-mowys, et cæteræ aves marinæ."

This Pentybers was almost certainly the same rock which now goes by the name of the Gulland, situated on the north coast of Cornwall ; it is only a little island, but it is some 150 feet in height, and precipitous, and lies about a mile from the mouth of the river Camel, not far from Pentyr Point. Clearly it could not have been identical with Lundy Island, for Lundy is separately mentioned,* besides being a long way from Tintagel.† I learn from Mr. Walter Barratt, of Padstow, that many Gulls and other sea-birds still yearly nest on Gulland, but that certainly no Gannets have bred there in modern times. Turning to the journal of John Ray, the naturalist, who was at Padstow with Willughby in June, 1662, we find him alluding to there being Gannets near there, but this was long after the time of Botoner; moreover, Ray gives no hint of their resorting for breeding purposes to Gulland or to Godreve, on which latter he and Willughby landed, or indeed to any island on the Cornish coast—in fact he did not even know that they bred on Lundy Island.‡

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* "Itinerarium sive Liber Rerum Memorabilium," Willelmi Botoner Dict. de Worcestre, Ex. cod. autographo autoris in bibliotheca Coll. Corp. Christi. Cant. No. 210. Edidit Jacobus Nasmith, Cantabrigiæ, 1778 (p. 111). Botoner was born in 1415 and died in 1482; the Itinerary is supposed to have been written in 1468. Besides Pentybers, Botoner describes other islands. Of Trescoe, in the Scilly Islands, he writes : "Insula Rascow pertinet Abbati Tavystock, continet in longitudine 3 miliaria, et in latitudine 3 miliaria, inculta, cum cuniculis [rabbits] et avibus vocatis pophyns [puffins];" and of another island : "non est populata, nisi silvestres herbas, aves vocat mewys [sea-mews] Kermerertes [Cormorants] et Katones [? Ratones] et muscæ, id est mowses."

If Gannets ever bred in the Isle of Man, Mr. P. G. Ralfe, author of "The Birds of the Isle of Man"—a very competent authority—is of opinion that a lofty stack at the south-east corner of the Calf, commonly known as the Burrow, must have been the place. But indeed

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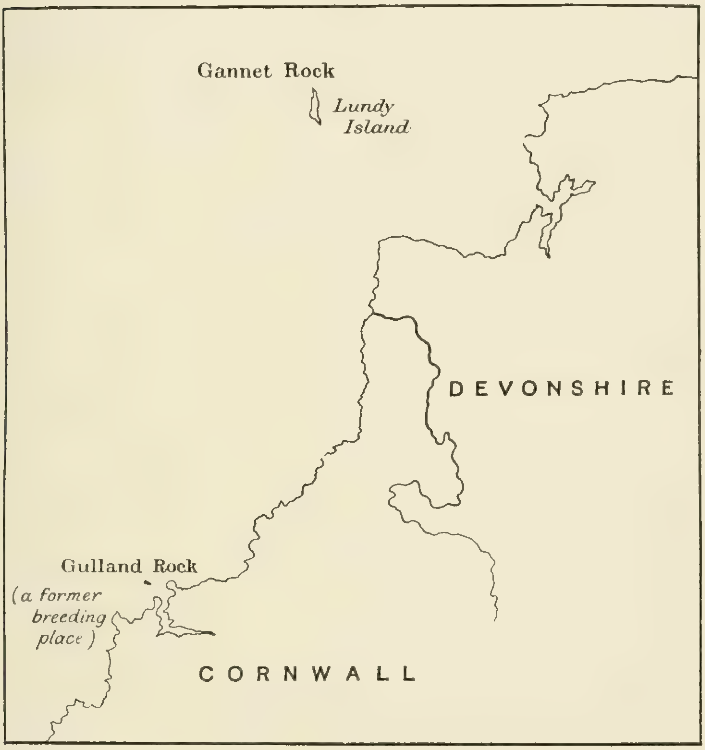
* "Nasmith," *t.c.*, p. 155.

† I must not omit to acknowledge my indebtedness to Mr. Howard Fox for the great trouble he has taken in assisting to ascertain the identity of Pentybers.

‡ "Memorials of John Ray, with his Itineraries," edited by E. Lankester (1846), p. 185.


Gannet Rock
Lundy Island
DEVONSHIRE
Gulland Rock
(a former breeding place)
CORNWALL

the only ground for suspecting their having bred there is one vague mention of them in Buchanan's "Rerum Scoticorum Historia" (1583), where, speaking of the Isle of Man, he says :—

"Frequens est cuniculis, avibusque marinis, eoque maxime genere anserum, quas *Solanas* vocamus."*

Incidentally it may be remarked that the Gannet is not one of the Isle of Man birds mentioned by Ray and Willughby in their chapter on Remarkable Isles where Sea-fowl build.†

For the present Lundy Island must be reckoned among the abandoned breeding-places, but no one can doubt that a nesting site known to have been occupied for 636 years, and in all probability far longer, would again be tenanted by birds so attached to their island homes as Gannets, if they were given adequate protection.

Scotland.—On the Scottish coast it seems possible that Gannets once nested on a few of the western islands, where they are now no longer met with, but the evidence about it is so meagre as to be almost worthless. Yet it must be remembered that young Gannets were eagerly sought after for food, and nowhere are such birds more easily driven from a breeding-place than on a small inhabited island, where the people would naturally take them. Accordingly we must not too hastily dismiss the testimony of Dean Donald Munro, that useful historian who visited the Western Isles in 1549, to the effect that at that period

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* Lib. i., xxxiv.

† "Ornithologia" (1676), chapter VII., p. 16.

Gannets nested on Eigg and Rum, two islands which lie on the west coast of Inverness-shire. It is true that of Rum, or Ronin, as he calls it, Munro merely says :—" Ronin . . . maney solan geise are in this ile," and of Eigg, No. 104 of his list of islands, he says very little more. " Egga. North from Ellan Murchd be foure myles, lyes ane iyle called iyle of Egga, foure myle lange and twa myle braid, guid maine land with a Paroch Kirk in it and maney Solane geese, and verey guid for store [*i.e.*, pasture] namelie for sheip, with a haven for heighland boths [boats]." John Monipennie in his " Abridgement or Summarie of the Scots Chronicles," 1597, a work of little authority, has the same information, but he is merely repeating in different words what he culled from Munro, and it is unnecessary to quote from him further. It may be added that no hint is given of Gannets having ever nested in Eigg in modern times by Mr. Evans,* or by the Messrs. Macpherson,† in their accounts of the birds of this island.

Among the many documents collected by Mr. G. G. Smith in " The Book of Islay " (1895) no mention is found of Solan Geese, nor is it likely that they ever bred on Islay, although in 1703 Martin had written of the Solan Geese and Culterneb [Puffin] as being most numerous on that island.‡

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* " Proc. Royal Physical Soc., Edinburgh," 1885, p. 443.

† " Zoologist," 1888, p. 412.

‡ " Western Islands of Scotland," p. 227.

Gannets are said to have bred at one time on Rona Island,* and as it is fairly precipitous, and only ten miles from Sulisgeir, where there are thousands, this seems not improbable.

It is certain that they have not bred in the Orkneys proper in recent times, and perhaps never ; and Mr. Combe, of the Whalsey Skerries Lighthouse, agrees with Dr. Saxby in thinking that they have not bred on the North Stack, Shetland,† and this concludes all the possibly abandoned breeding-places for Scotland.

Ireland.—As previously stated,‡ there is some reason for supposing that Gannets may have formerly bred on some rocks about four miles from the coast of Mayo, although the the fact of Mr. Knox's having shot young ones which could fly§ proves nothing.

Iceland.—The late Professor Newton, while disbelieving in the existence of any Gannets at Drangey, thought that there was a possibility of their having bred on Mevenklint, a rock to the northward of Grimsey Island.

Canada.—Two nurseries in North America have been entirely abandoned, as was stated in the last chapter (*see* p. 311), viz., a rock adjacent to Great Manan Island, and Perroquet Island, where Gannets bred up to 1887 as well as the settlements on Percé Rock, and on a rock near Yarmouth N.S., but it was owing entirely to man's interference that they were forsaken. In the sixteenth century there seem to have been Gannets on Funk Island. (*See* p. 294.)

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* "Proc. Royal Physical Soc. Edinburgh," 1883--85, p. 65.

† *See* "The Birds of Shetland" (1874), p. 322.

‡ *See* p. 74.

§ "Birds of Ireland," iii., p. 451.

CHAPTER XI.

ESTIMATE OF THE NUMBER OF GANNETS.

An estimate of the total Gannet population—Comparison with that of other Sea-birds—The Kittiwake—The Guillemot—The Puffin—Puffins thought to be the most abundant sea-birds in Europe.

An estimate of the total Gannet population.—The desirability of attempting censuses of some of our native birds was a favourite idea of John Wolley, and that acute observer even regarded it as one of the chief requirements of British ornithology. Difficult of application as was any sort of scheme, the idea did not fail to meet with Professor Newton's support, and after Wolley's death he made public the latter's views, as well as his own, on the subject.* The idea, however, of endeavouring to make an actual count of birds which nest in large communities—as the rock-breeding sea-fowl do—had either not at that time been thought of, or had been dismissed as impracticable. Yet it is among this class of birds that the most feasible hope of effecting a census with any degree of accuracy lies. Now, if there is any species which lends itself to a scheme of counting more than another, it is the Gannet, which is large, slow in its movements, and very conspicuous, and, moreover, it is a species of which the breeding-places are so few, and all of them well known. In fact, the Gannet has but fifteen breeding-places—all of them on islands—and of what other European sea-bird can the same be said? There are, it is true, a few northern species which breed in high latitudes—like the Little Auk—which have comparatively few breeding-sites, but none so few as fifteen. I must say that some of the estimates of Gannets at their breeding-places which have been put forward in the past, seem to an unbiased enquirer to be very much above the mark. Such estimates, I mean, as those given in a "Report on Herring Fisheries of Scotland" (1878, p. 171), which are repeated, with some variations, in Seebohm's "British Birds" (iii., p. 643), and elsewhere, and to which I shall not give further publicity by repeating them. They originated in a letter written by Captain S. McDonald, of "The Vigilant," in 1869, to Lord Caithness, which is printed as a note in the Report just mentioned. But McDonald's figures are admittedly only guesses, and according to most people's views they are much too high.

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* "On the possibility of taking an Ornithological Census," "Ibis," 1861, p. 190, and "Proc. Linnean Society, 1862 (Zool.)," p. 23.

The figures now submitted are supposed to be taken in the month of May. Let us for convenience sake fix a date, and suppose a census taken at every Gannetry on the 1st of May, 1910, which would be before any of the eggs would have had time to hatch. It seems simpler to take the month of May than to suppose a census done in August, and to let it include the young ones, of which a very large percentage appears to die a natural death during the first twelve months—that is, if they have not already been killed for eating by human beings.

ESTIMATED NUMBER OF GANNETS (*Sula bassana*) IN THE NORTHERN HEMISPHERE.

England—		
Lundy Island		—
Wales—		
Grassholm Island		400
Ireland—		
Bull Rock, co. Cork	500	
Skellig Rock	16,000	
		16,500
Scotland—		
Ailsa Craig		6,500
St. Kilda—		
Borrera	16,000	
Stack Lii	8,000	
Stack Armin	6,000	
		30,000

Sulisgeir		8,000
Sule-skerry Stack		*8,000
The Bass Rock		6,500
The Færöes—		
Myggenæs		1,500
Iceland—		
Vestmann Islands	4,000	
Eldey		
Geirfugladrangr	9,500	
Grimsey	100	
		13,600
Canada—		
Bonaventure	7,000	
Bird Rock	2,500	
Little Bird Rock	500	
		10,000
		101,000

These figures, which, as has been said, are exclusive of nestlings, and, in fact, include no young ones under eight months old, may not seem large, possibly they are below the truth, but I cannot think that they are much below it.

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* Estimated at 5,000 on p. 164, but I have since thought it safe to raise the number to 8,000, which is still far below McDonald's figure.

Huge flocks of birds are very deceptive, and at first sight they are apt to appear larger than they really are. Assuredly a thousand big white birds cannot fail to make a great show, especially if they are on the wing. The incessant motion of so many pinions is trying to the eye, and I am positive that to some persons it is very delusive—producing a sort of kaleidoscopic effect. Even a number of birds when they are at rest are misleading enough for an experienced naturalist to greatly overrate them; let those who disbelieve it ask some friend to look at seven or eight hundred dots of ink—which have been previously counted—spread out on a large sheet of paper, and then make him guess how many there are: the guess will generally be quite wide of the mark, according to my experience.

Whatever the real number of Gannets may be—and probably it will ever remain a matter of conjecture—this much is certain, that they are essentially British birds, and that to the British Isles three-quarters of them belong by right of tenure of eight breeding-places.

A comparison of the abundance of Gannets with that of other sea-birds.—Although it is somewhat foreign to the present treatise, which is about Gannets, to dilate on other birds, yet I must take leave to digress a little for the purpose of drawing a few comparisons between the Gannet population and that of certain other species. One hundred and one thousand Gannets is a total which is certainly less by tens of thousands than that of several sea-birds which inhabit the same sort of places. Of that no one can have much doubt. It is a total which must be considerably less than that of the other two British members of the great group of *Steganopodes*, viz., the Cormorant (*Phalacrocorax carbo* (L.)), and the Shag (*P. graculus* (L.)), because the distribution of the Cormorant extends over Asia and Australia, while the Shag, though inhabiting a much smaller area, is admittedly an abundant species; on the other hand, if we only take the British Isles, the numbers of the Cormorant and the Shag respectively are, perhaps, not very different from the Gannet, at any rate they are near enough for comparison. If we allow that there are 76,000 Gannets in Great Britain and Ireland, as set forth in the preceding table,—whether on sufficient authority or not, the reader must judge,—it ought not to be too much to guess the Cormorants at 80,000 and the more plentiful Shags at 100,000.

It has often been asked: What is the most abundant species of bird in the world? That, much as we should like to know it, is a question impossible to answer. Some would say the Sparrow (*Passer domesticus* (L.)) or the Skylark (*Alauda arvensis*, L.). Charles Darwin thought it was the Fulmar Petrel (*Fulmarus glacialis* (L.)). Others who have come after him conjectured that it might be the Little Auk (*Mergulus alle* (L.)), but the breeding-places of the Little Auk are limited. It is not likely that at the present time the palm for superiority would be held by either the Fulmar or the Little Auk. There is a competitor which I should place before either of them, and that is the common Kittiwake Gull (*Rissa tridactyla* (L.)). Kittiwakes are marvellously plentiful right up to the North Cape, where Mr. H. Seebohm estimated there were 500,000 at Sværholt,* when he was there, and attempted a reckoning. In the Færöes they were found by Colonel Feilden breeding in countless thousands,† and plenty of other striking evidence might be adduced. Moreover, the Kittiwake of the North Pacific, where it is very abundant, cannot be kept apart from *R. tridactyla*, which further increases the tale of its numbers, which unquestionably are immense.

The Common Guillemot (*Uria troile* (L.)), again, must be one of the most abundant birds in the northern hemisphere. In the Færöes, H. C. Muller, a good and truthful naturalist and resident in those islands, states that as recently as 1862 the annual consumption of Guillemots was 55,000.‡

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* "A History of British Birds," III., p. 342.

† "Zoologist," 1872, p. 3288.

‡ "Færöernes Fuglefauna" (1862).

Mr. T. H. Nelson says that 80,000 Guillemots' eggs are taken in a season by the Flamborough Head climbers,* in an ordinary year, which would be two or three layings, but it is not likely that they get three-quarters of them. The Rev. Neil Mackenzie states that he has seen about 12,400 Guillemots' eggs collected on one small island at St. Kilda, and that probably not more than half of them were taken by the inhabitants.† It would be easy to adduce other evidence.

Brünnich's Guillemot (*Uria bruennichi*, S.) is also immensely numerous, but the area occupied by it is more limited than the area of the Common Guillemot (*U. troile*)—that is, if we distinguish it from *U. arra*, Cass. This latter is termed by Mr. H. W. Elliott the great egg-bird of the North Pacific, frequenting more particularly the Prybilov Islands "by millions."‡

At the present time the superabundance of the Puffin (*Fratercula arctica* (L.)) has impressed itself upon many observers, and, after collecting from various quarters all the available evidence about it, it certainly seems as if the Puffin were now the dominant species, numerically speaking, in Europe, yet it only lays one egg.* Of course we must bear in mind that the numbers of all birds fluctuate, and from so many causes, that what is the most abundant species now, may be by no means so in another quarter of a century.

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* "Birds of Yorkshire," II., p. 717, corrected from 130,000 in the "Errata."

† "Annals Scot. Nat. Hist.," 1905, p. 149.

‡ "Report on the Prybilov group [Alaska]," 1873.

In the southern hemisphere, judging from what Mr. William Sclater and others tell us, it is very likely that the dominant species would be the prolific Jackass Penguin (*Spheniscus demersus* (L.)).† ‡

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* Professor Newton—an exceptionally cautious writer—thought that he might venture on an estimate of 3,000,000 Puffins for the Shiant Isles ("Dictionary of Birds," p. 751), and the Rev. Neil Mackenzie would allow 3,000,000 more for St. Kilda ("Annals of Scottish Nat. Hist.," 1905, p. 151), where, according to Mr. J. Sands, 89,000 were taken in one year—the year 1876 ("Life in St. Kilda"). *See* also Wiglesworth's "St. Kilda" (p. 59). But it is far from being in the British Isles only that Puffins abound. There are endless streams of them in the Færöes, and here we are on safe ground, having statistics of the numbers formerly taken. In his "Færöernes Fuglefauna" (1862), Sysselmand Muller—a most reliable naturalist—tells us that 235,000 Puffins used to be annually gathered by the inhabitants. Now there is no longer the same demand for them, but this figure was no doubt quite correct when Muller wrote, and the same number might be gathered again. In Iceland also the Puffin must be very abundant, for in 1897 the number taken at one station—Sulusker, *see* p. 281—was ascertained by Mr. E. Gurney to have been 31,143.

† *See* the photographs of them in "Three Voyages of a Naturalist," by M. J. Nicoll, and in "The Condor," 1907, p. 71; also *see* "Fauna of South Africa" (IV., p. 520). In 1901 Mr. Sclater tells us 638,000 eggs were gathered by Government agents; in 1902, 469,400.

‡ *Birds in Markets.*—Nothing which will help us to the establishing of some standard whereby we may gauge bird populations is to be despised, and as I have gone out of the way to discuss the subject, I cannot help

suggesting that there is a good deal to be learnt from the market returns which are sometimes kept in large towns. Very remarkable statistics might, I believe, be compiled about Woodcocks, by any one who had leisure to seek them, but the undertaking would be a work of labour. Already some of value have been collected by Mr. L. Ternier of Honfleur, who says that in 1902–3 24,247 Woodcocks were brought to the poultry markets of Paris, in 1903–4 23,090, and in 1904–5 30,200 (" Proc. 4th Intl. Congress," p. 660). Unfortunately no returns are obtainable from the markets of London. As is well known, Thrushes have long been an important article of consumption in many countries of Europe ; in some cities they have been annually sent to market in incredible quantities, and particularly used this to be the case in the South of France, where, in consequence, they have now decreased in numbers. From the authors of " Richesses ornithologiques du Midi de la France " (1859), p. 208, we learn of 315,000 Song-Thrushes (*Turdus musicus*) having been captured in a limited extent of country in a year, together with 35,000 Blackbirds and Mistle-Thrushes, but they are not any longer taken in such abundance. Then again, there is the trade in Larks. Professor Newton quotes (Yarrell's " British Birds," 4th edition, I., p. 621) J. M. Bechstein's statement that 404,000 Larks—presumably all *Alauda arvensis*, L.—were brought into the city of Leipzig in one month (probably October) of the year 1720 (*see* " Gemeinnützige Naturgeschichte Deutschlands," 2nd Afl., Bd. III., p. 779). Stupendous as is this number, it finds confirmation in Naumann's remark that the excise lists still showed that 500,000 were being supplied annually to Leipzig when he wrote, while even more were sent to other towns (" Naturgeschichte der Vögel Deutschlands," 1824, IV., p. 185). In France also the trade in Larks was, and still is, very large. To Mr. L. Ternier I am indebted for a great deal of information about this industry, and for statistics of the numbers sold in the markets (Halles Centrales) at Paris. In 1898 the number returned as sold was 1,419,891 ; in 1899 1,179,142 ; in 1900 927,806 ; in 1901 1,238,277 ; in 1902 961,905. Since then the figures have been rather lower, and in 1909 Mr. Ternier is informed the supply had dropped to 355,000. But this is only for Paris, every other market town, as Mr. Ternier observes, receives its supply also, and a very large supply in some cases ; for instance, Mr. Ternier states that in the market of Argenton, which is a small town in the Department of Indre, about 168,000 Larks, believed to be nearly all *Alauda arvensis*, are sold in a season. Again, there is Mr. Robert

Gray's quotation from some official source—but he does not say what, and Mr. Ternier is unable to find it for me—of 1,255,500 Larks having been taken in the vicinity of Dieppe in 1867–8 (" Birds of the West of Scotland," p. 123). Something also I think is to be gathered from the number of Ostriches which are now kept for the profit arising from their feathers. In 1896 the number of Ostriches farmed in Cape Colony was officially returned at 225,000, and in 1904 at 357,808 ; since then they are believed by Professor Duerden to have greatly increased, but later statistics, I am informed by the Agent-General, are not available. The South American Ostriches, commonly called Rheas (*Rhea americana*, Lath.) in the Argentine States, are even more abundant than the Cape Ostriches. In 1909 the number of Rheas in semi-captivity was returned by H.M. Consul at Buenos Ayres as being 409,000 (" The Field," October 2nd, 1909).

CHAPTER XII.

NIDIFICATION AND INCUBATION.

Habits of the Gannet during the period of its nidification—The period of incubation—Absence of "a hatching-spot" in the Gannet—Its egg.

The Gannet's Nidification.—Having now discussed all the Gannet's breeding-places, used and disused, and hazarded a guess at the number of individuals resorting to each of them, we pass on to another and different section of this bird's life-history, and we cannot do better than begin with what is the most important period of every bird's existence—its nidification. I know that there are some naturalists who look upon very minute details of a bird's habits and economy as superfluous. Others there are on the contrary, and I think these are much better advised, who deem that every note, every attitude, every change in flight or gait, every alteration as regards food and nidification, and every moult of feather must have its reason, and accordingly be worthy of study—whereby we may elucidate its meaning. Assuredly, if there is anything lying behind the feathers of a bird which is akin to the mind in a human being, it is only by close study that we have a chance of fathoming it.

Gannets—which, like nearly all other sea-fowl, are birds of social predilections, and breed in large companies—must needs return to their breeding-places early in the spring, because their nursery operations are of the longest, lasting over four months, that is, if we calculate from the period of their commencing to build to the time when the young bird essays its first flight from the rocks. Accordingly they make their appearance about the end of February at the Bass Rock and the other Scotch breeding-places, fly a good many times around their accustomed home, and, when March has set in, each one proceeds to select its ledge and begin building. I can testify to there being plenty of nests at the Bass by the beginning of March. Amongst those who, from being on the spot, certainly ought to know best, it is the common opinion that Gannets pair for life; but this belief has no other foundation than the fact—admittedly a suggestive one—of precisely the same rocks being occupied year after year.

*The Nest.**—Nearly every Gannet's nest which has come

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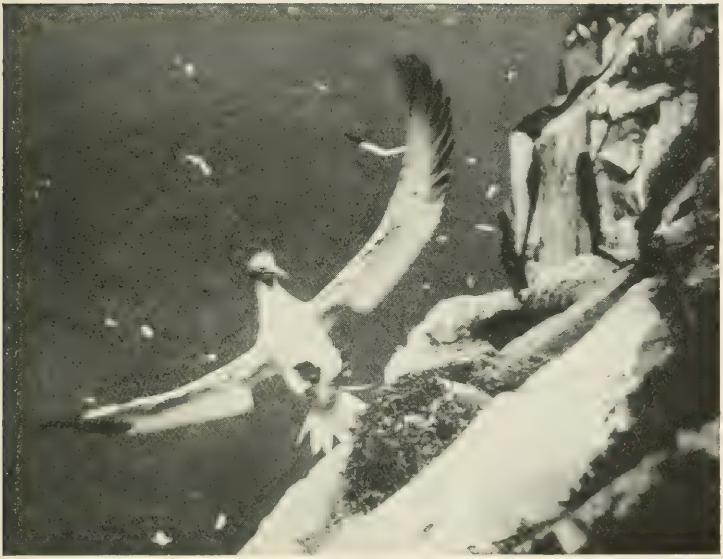
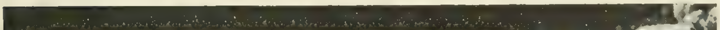
* Caliology (Gr. καλιά), or the study of Birds'-nests, is a subject which has hardly received the attention it deserves at present. What marvellous differences are there between the nests of birds, in size, in position, in construction, between, for example, the nests of the Song-Thrush and the Partridge, the Rook and the Woodpecker—to take only some of



[Bentley Beetham, Phot.

GANNET ALIGHTING ON NEST.



[Bentley Beetham, Phot.

THE SAME GANNET ALIGHTING.

[Bentley Beetham, Phot.

THE SAME GANNET.

[Bentley Beetham, Phot.

THE SAME GANNET ABOUT TO LEAVE ITS NEST.

under my observation—though I daresay they have not been nearly so many as some naturalists have pried into—has been made of sea-weed, and of quite large pieces, too, in particular a preference being shown for the long fronds of the dark Tangle (*Laminaria digitata*). It will be observed that the nests in the four photographs, all of which were done on Ailsa Craig by Mr. Beetham from the same bird, are made of sea-weed, probably *L. digitata*. Naumann says they also make use of *Fucus serratus*, and Mr. William Evans gives *F. vesiculosus*. I am not learned in sea-weeds, but think that this list might be still further extended. Macgillivray says they sometimes go sixty miles to get it,* but this can hardly be because none is found nearer: the seaweed gradually dries, adapting itself to the contour of the rock upon which it rests, which gives it some adhesive properties, and it is remarkable how seldom the nests are blown away.

At Ailsa Craig the stems and leaves of campions, both *Silene Cucubalus* and *S. maritima*, are ready to hand, and these

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our commonest birds—the open nest of the Robin, and the domed nest of the Wren, between the artless care of one bird which lays its egg on the bare ground, and the wonderful structure of another which employs two thousand feathers in the fabric of a cradle for its young. Systematists, however, are slow in attaching any importance to characters deduced from these things.

* "British Birds," V., p. 416.

are as good as sea-weed, and make useful nesting material,* of which the Gannets are not slow to take advantage. At the Bass it is not unusual to see straw in some of the nests†—on one occasion the Rev. H. N. Bonar counted a dozen straw bottle-covers in as many nests—and there the Gannets are very partial to coarse grass, but I have never heard that they go to the mainland for it. On the contrary, the grass is torn by large beak-fulls off the Bass itself, and near to the great rock's summit may be seen many deep holes, which are by no means all the work of rabbits.‡ In Martin's day the poor islanders of St. Kilda complained of the Gannets on Borrera taking too much of the valuable pasture intended for their small stock of mountain sheep ("Voyage to St. Kilda," p. 42), and John Macgillivray, who was there in 1839, found the grass nearly destroyed by them. Gannets' nests have ever been regarded as substantial edifices,—although only intended to receive one egg,—in truth, their size attracted attention centuries ago, when in a fissure, or leaning against the rock; Mr. J. M. Campbell has obliged me with a photograph of one five feet in height, but they are not all equally large, and some do not measure eighteen inches across. As the season advances, the nests would grow smaller and flatter, if it were not for the additions made to them, for the sea-weed shrinks as it dries, and the bulky young one pressing upon it is no light weight. In a shrunken condition nests sometimes weather twelve months of storm and tempest, and last until another season comes round ; in the Færöes, indeed, according to Müller, Gannets more often add to an old nest than start a new one, but I hardly think that can be said at the Bass Rock. The Rev. N. Mackenzie tells us they " are renewed from time to time " at St. Kilda.* The odour of a Gannet's nest is not altogether pleasant, for there is often a strong taint of ammonia about it, arising from the excreta of the birds, with which the surrounding rocks are freely bespattered, often mixed with rain and spray, to say nothing of rotting remains of fish.

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* *See* p. 92.

† *See* p. 241.

‡ Martin remarks that Gannets generally choose a windy day for plucking the grass, probably that is merely because it is unsuitable weather for fishing.

At the Bass Rock quite a category of miscellaneous articles has been found at one time or another in Gannets' nests, for instance, from various sources I have heard of a butter-scoop, a battledore, a golf ball, two indiarubber shoes, some toy whips, a scent bottle, a peacock's tail-feather, a knife, some little baskets, and a net-maker's needle. So it seems that anything and everything found at sea comes handy, including straw, which Mr. W. Evans has seen used as have I.*

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* " Annals Scot. Nat. Hist.," 1905, p. 144.

In his " Description of the Western Islands of Scotland,"† Martin says :—" . . . the steward of *St. Kilda*, told me, that they had found a red coat in a nest, a brass sundial, and an arrow,‡ and some *Molucca* Beans in another nest."§ A coat must have been a heavy item to carry up to a nest, but I was told at the Bass of a good-sized basket, intended for bottles, which had been conveyed to one. Sticks and pieces of wood and even small branches, are sometimes picked up and used,|| but perhaps not so much as formerly, when the garrison on the Bass Rock were glad enough to collect them from the nests of the birds for fuel, as old writers testify, one of whom, Hector Boece (1526), tells us that " . . . thay gadder sa great noumer of treis and stikkis to big thair nestis, that the samin micht be sufficient fewell to the keparis of the castell, howbeit thay had na uthir provision." And

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* *See* p. 241.

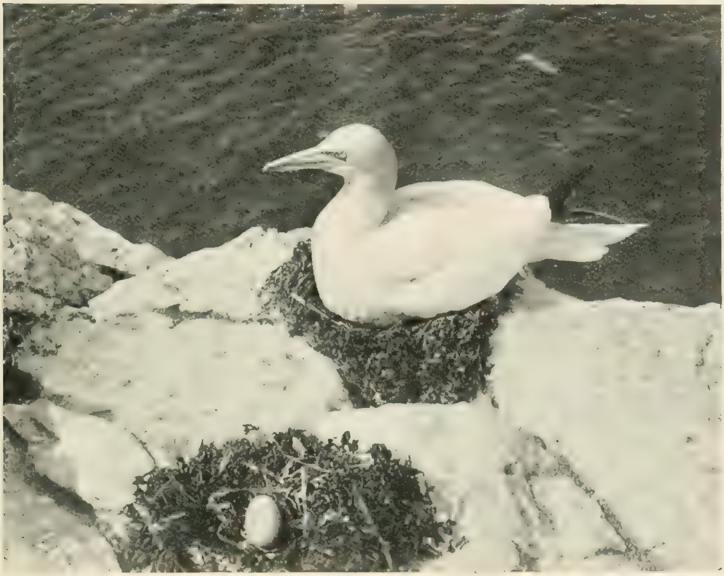
† Published in 1703.

‡ P. 283.

§ It is likely that this arrow, and also one found in the neck of a Great Northern Diver in Ireland (Thompson's " Birds of Ireland," III., p. 201), were of Indian or Esquimaux origin.

|| *See* Gray's "Birds of the West of Scotland," p. 461.

De Beaugué and Bishop Leslie write in the same strain. However, the Rev. H. N. Bonar saw three branches of ash, from eighteen to twenty-four inches in length, in Gannets' nests, on July 13th.*



[*H. N. Bonar, Phot.*

GANNET ON ITS NEST.

There seems to be no doubt that both sexes take part in the task of incubation, and the Rev. N. Mackenzie agrees with Martin in thinking that the old birds sit by turns.†

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* Here it may be mentioned that Mr. W. Evans found the Common Earwig, and a brachelytrous beetle (*Philonthus æneüs*), plentiful in Gannets' nests on the Bass in August.

† "Annals Scot. Nat. Hist.," 1905, p. 144.

Before alighting on their nests, Mr. Bonar has remarked that they always utter a cry or call-note. Gannets sit by preference with the beaks towards the cliff, and not pointing seawards, which may be to save their tails from abrasion.*

The so-called Barren Gannets.—Gannets—that is, adults—are not infrequently to be seen in summer so far from any breeding place as to imply that they cannot have any intention of nesting ; while others remain at the breeding places, but, as Martin long ago pointed out, they sit apart, and are thought not to have any nests. These bachelors have often been noticed, yet there is no reason to limit them to one sex, for some may be females. A considerable number, as I was assured by Mr. Laidlaw, have been in the habit of frequenting a particular grass slope on the northern side of the Bass, all of which were looked upon by him as being non-breeders, yet some, perhaps, may have been merely practising a forced abstention, owing to the particular nesting-sites on which they had set their wishes being already occupied by others.

The Egg.—The change which comes over the nature of birds at the breeding season is singular. Restless Gannets, which spend the whole day on the wing, are now content to brood their one egg, sitting almost motionless for hours, if not for days. Timid as is the Gannet in winter time, it will now permit a human being to approach within a few yards of its nest, all thought of self-preservation giving way to the parental instinct. The egg of a Gannet is white when laid, with a chalky coating like the eggs of Shags, Pelicans, Darters and Frigate-Birds,* and the surface of its shell is often creased and wrinkled, a character well shown in Mr. Wilson's drawing.† This outer calcareous jacket can be easily scraped off the egg, when the shell will be found to show a green tint, especially when held up to the light. This is in reality, as Mr. R. Drane has pointed out, a greenish shade obtained by means of transmitted light,‡ the lining or follicular membrane being white, and from this the shell can be easily separated. Lime is a valuable ingredient in the formation of an egg-shell, and Mr. Drane has shown that Gannets and other sea-birds obtain lime from the fish, of which they eat such large quantities.§

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* A pair which I had in a walled-in garden generally faced towards the wall, as if it reminded them of their own cliffs.

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* But not like the Tropic-bird's egg, which is spotted, in which it differs from the other *Steganopodes*.

† Similarly the egg of the Emperor Penguin is sometimes covered with chalky nodules ("Nat. Antarctic Expedition," 1901–4).

‡ "Cardiff Naturalists' Society," 1893–4, p. 8.

§ With a view of demonstrating that there was lime in a fish he burnt 8 ozs. of sprats in a Hessian crucible until they were reduced to 140 grains of black ash, and this sediment he further reduced in a platinum capsule to 78 grains of pale ash, which he found to be phosphate of lime. After weighing an empty Gannet's egg he concludes that it would only require the lime derivable from 1 lb. of fish to form one ("Cardiff Naturalists' Society," 1893–4, p. 12).

The Gannet's egg is nearly elliptical in shape, and an average one measures 3 inches by 2 inches, which is by no means large for the size of the bird. An Irish one received from Mr. Ussher only measures 2.8 inches, and a greater disparity than that might be found. Mr. Dresser gives the average of fifty-five eggs as 3.06 inches by 1.96 inch.* I should say the yolk also, which is the food store of the unhatched chick, was very small in proportion to the size of the shell which contains it. Perhaps if the egg were bigger, and the yolk also, the Gannet chick would be more developed when hatched than is the case, which would be in accordance with received theories. The weight of a fresh egg, taking an average-sized one, is about 3 ozs. 190 grains. When very near to hatching they might be expected to be lighter, accordingly one from which the embryo was afterwards removed by Mr. E. Corder, was tested by him and found to be 3 ozs. 50 grains. On the other hand, another near to hatching, which was slightly larger, was 3 ozs. 210 grains; but it must have been more still when fresh. I must say I think Gannets' eggs are better eating than Guillemots'; both have often been made use of as an article of food, but I cannot imagine anyone getting very fond of either! There is a slight flavour of musk about the former, which is hardly agreeable to my taste. The

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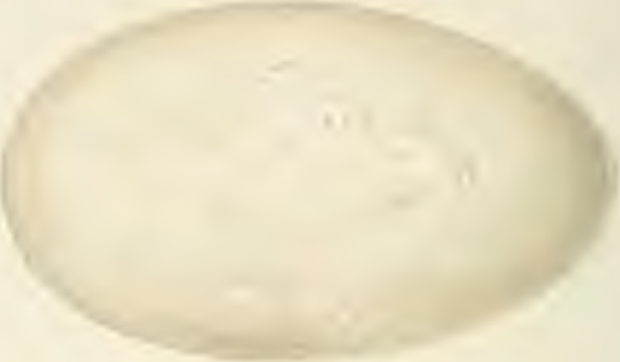
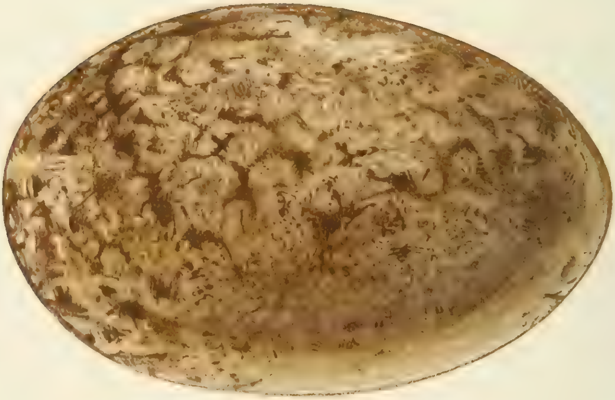
* "Eggs of the Birds of Europe," by H. E. Dresser.



EGG OF THE GANNET (WHEN FRESH).



EGG OF THE GANNET (WHEN INCUBATED).

[*Face page 345*]

eggs of the Gannet were formerly in considerable request at St. Kilda, where, according to our observant author Martin, they were held to be good alike for food and physic, and he also attributes the good voices the inhabitants had to "the Solan Goose Egg Supp'd Raw '; in another place he says they were found to be "very Pectoral and Cephalick,"* but this was only so for the islanders, as they made the men of his crew ill. A Gannet's egg has been described as "an aquamarine in an opaque casing of white chalk," and that is no exaggeration when it has been cleaned. There is no colour concealment in a Gannet's egg, which indeed has no need for any such protection, for the inaccessibility of its breeding-places is enough. Normally they are white, but they are not free from stains even when just laid, and an egg generally gets very dirty long before the process of incubation is completed, which is not to be wondered at, for it is rolled about and covered by its owner's dirty feet, in all weathers.† Mr. Wilson has coloured a drawing to show what an egg in the soiled state is often like when contrasted with one newly-laid; it was selected, on the Bass Rock, as being near to hatching and very discoloured, but many others may be found quite as brown.

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* "Voyage to St. Kilda," pp. 50-76.

† Other rock-birds' eggs get very dirty; the egg of the Guillemot is sometimes covered with dirt.

With regard to the period at which the Gannet begins laying, I was told when at the Bass that occasionally a few eggs were to be seen at the end of March, but ordinarily they are deposited in April. At St. Kilda they are not obtainable in any numbers before the first or second week in May.* On August 29th and 30th, 1906, there were still a few eggs on the Bass Rock, very dirty, and probably only rotten ones; there did not seem to be any nestlings younger than about twelve or fourteen days. Whether incubation usually commences immediately after laying, or whether there is an interval of days, or even weeks, I do not know.

With regard to the number of eggs which a Gannet can lay, if pressed, Mr. J. Laidlaw's experience at the Bass Rock has been, that if the first egg be taken, a second will be laid, and if that be removed, possibly a third. To this the Rev. H. N. Bonar, who resides in that neighbourhood, assents, and so does Martin,†—and more recently the Rev. N. Mackenzie,‡—but a member of the Berwickshire Naturalists' Club has alleged, with some confidence, that many more than three can be laid.* Whether a Gannet ever rears a second young one in a season is doubtful; indeed it is hardly likely, considering the forty-two days of incubation, as well as the length of time during which a young Gannet is helpless, and the nest consequently required.

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* "St. Kilda and its Birds," by J. Wiglesworth, p. 49.

† Martin's words are: "Every fowl lays an egg three different times (except the *Gair*-fowl and *Fulmar*, which lay but once)." ("Voyage to St. Kilda," p. 64).

‡ "Annals Scot. Nat. Hist.," 1905, p. 144.

Among birds which breed gregariously it must infallibly happen, although they may normally lay but one egg, that two will sometimes be seen in the same nest, but not necessarily laid by the same bird, and this is not an infrequent incident with the Gannet. But that there should be two eggs, and both of them far advanced in incubation, as were found by Dr. J. Wiglesworth on one occasion at Stack Lii, must be very unusual.† That sea-birds not infrequently sit upon one another's eggs has also often been suspected; to my mind it would be extraordinary if it were not so, and it seems that mistakes of this kind are made by the Gannet.‡ Visitors to the Bass Rock must have noticed how when Gannets come in from the sea, instead of at once alighting, they generally spend some time in scanning the ledges.* John Wolley thought their homing instinct was occasionally at fault, for when at the Bass on June 10th, 1848, he saw "a Gannet alight by a nest on which another was sitting, which then immediately left it and waddled to a nest, at a couple of yards distance, containing an egg and took its seat upon it, while the newly arrived Gannet occupied the nest left."† Mr. Pike has also watched a Gannet endeavouring to pull another Gannet away by the beak from her nest, on which she had apparently sat down by mistake.

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* *See* "Ber. Nat. Cl.," 1873, p. 17.

† "St. Kilda and its Birds," p. 49. Mr. O. G. Pike has also seen two eggs, both incubated.

‡ It is fair to mention that Mr. Laidlaw in May, 1907, daubed three Gannets with paint of different colours, and for fourteen days he assures me that each of these birds was always on or near the same egg, after which, unfortunately, Mr. Laidlaw had to be away from the Bass, and his assistant discontinued observations.

The Chick in its Embryonic Stage.—At present there are many birds whose embryology has not been studied, yet this is a period in the later stages of which the anatomist may hope to find considerable variation of development, and it is possible that there may be something unexpected in *Sula*. I have secured Mr. Edwin Wilson's services to give an accurate drawing of a Gannet's egg, very near to hatching, from which half the shell has been removed, and this exhibits the appearance of the interior and the position of the embryo admirably. It will be seen that the head of the chick, which has grown more rapidly than the body and is disproportionately large, lies curled up on one side of the egg-shell, but its position is nearer to the large end. It is doubtless the large end of the egg which traverses the oviduct foremost in the process of being laid, as is possibly the case in all birds, although the contrary has been asserted.* Mr. Wilson's drawing also shows the rounded form of the beak, which is rather remarkable, and this roundness continues to be still plainly observable for several days after the Gannet-chick has been extruded from the egg. Another point is that the connection of all the toes

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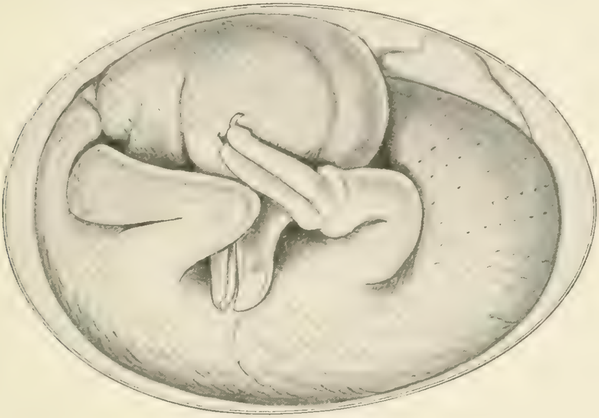
* Guillemots, on the other hand, generally fly straight to a particular ledge without the smallest hesitation.

† "Ootheca Wolleyana," II., p. 453. Instances to prove that birds do not know their own eggs are cited in "The Indian Field" of April 12th, 1906.



EGG WITH THE EMBRYO.

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* *See* " Key to North American Birds " (1884), p. 224. In mammalian births also, when normal, the head is presented first.

by a web is plainly visible in the folded foot, which is seen resting upon the head. Numerous filaments of down can be detected covering the body of the embryo in regular rows. When at length the embryo has become a fully formed Gannet-chick, it inhales air into its lungs, and breaks the shell—the walls of which have been growing weaker—by means of a hard scale, or "egg-tooth," as it has been termed, at the end of its beak. According to Mr. T. C. Walker's observations, the old Gannet sometimes assists in the operation,* but of this I have no other evidence, and think it requires confirmation.

The Gannet's mode of Incubation.—On my first visit to the Bass Rock, which was in 1876, one of the men surprised me by saying that the Gannet incubated her single egg by covering it with her large webbed feet. I was not then aware that this singular habit had been placed on record in the sixteenth century by Conrad Gesner,† though subsequently it was discredited by less informed writers, and disbelieved. It takes men a long time to put aside prejudice and preconceived ideas when investigating the habits of birds. By good fortune I was destined to have my incredulity removed by seeing something of the *modus operandi* myself on a future occasion. This is what Gesner has about it in his "Natural History":—"Ego nuper ex erudito homine Scoto* accepi, hos anseres Solendgens dictos, longiores domesticis esse, sed minus latos; in rupibus oua parere: & superposito pede altero (unde nomen fortassis à solea, id est planta pedis, quam & Germani sic nominant) tandem excludere."† At first sight such a strange method seems very contrary to the usual procedure of birds engaged in incubation, but in reality it is not a whit more peculiar than the methods which many other birds are known to adopt. The Grebe covers its egg with reeds; the Ostrich often leaves it to the sun; the Egyptian Plover buries it in the sand‡; the Megapode and Brush-Turkey of Australia heap great mounds over it, composed of vegetable matter, leaving the heat generated by fermentation to do the rest. The Emperor Penguin (*Aptenodytes forsteri*) places its foot not upon its egg but beneath it in order to keep it off the ice, as, for a different reason, does the Guillemot (*Uria troile*).§

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* "Zoologist," 1868, p. 1366. It is certainly by the unaided efforts of the nestling in most species that liberation takes place, but Mr. H. F. Witherby has seen a domestic Fowl peck at the egg, as if helping the chick out.

† And also noticed by Swave.

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* Henry St. Clare.

† "Historia Animalium" (1555), III., p. 158.

‡ *Pluvianus melanocephalus.* *See* Seebohm's "Charadriidæ," p. 250.

§ Mr. T. H. Nelson writes: "I have several times observed the parent pulling the egg on to her feet and tucking it into place with her bill" ("Birds of Yorkshire," II., p. 721). *See* also Selous' "Bird Watching," p. 194.

As might have been expected, the habit of thus covering its egg is common to *Sula capensis* (the Gannet of South Africa) and to *S. serrator* of Australia. Of the former, Mr. W. L. Sclater says, " Only one egg is laid : on this the bird sits very closely, covering it with its large webbed feet."* Of *S. serrator* Mr. A. Mattingley, who has recently visited the Lawrence Rocks gannetry,† writes : " I have photographs taken by me showing this peculiar habit of holding the single egg which forms their full clutch. The egg is always held between the web of two toes. . . ."‡§

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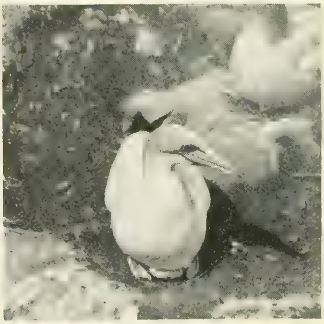
* " Ibis," 1904, p. 84.

† " The Victorian Naturalist," 1908–9, p. 18.

‡ *In litt.*, March 1st, 1910.

§ I do not find any mention by authors of Boobies (*Sula cyanops*, *S. leucogaster*, *S. piscator*, etc.) placing their feet on their eggs, so perhaps they do not do it, their mode of nidification being different from that of the true Gannets in several ways. As I have not a photograph of *Sula bassana* with its feet on the egg, I am grateful to Mr. Mattingley for one of *S. serrator* done in Bass Strait, Australia.



The whole process has been described by the late Mr. E. T. Booth, who, taking daily notes of a Gannet which bred in confinement at Brighton—which consequently gave him great facilities for observation—has related* how before sitting down on its nest, the old bird spreads the web of one foot carefully over the egg. Then it places the other foot as closely as possible over the first, and then drops on to the nest. Mr. J. M. Campbell, of the Bass Lighthouse, has also given his account of what takes place : "Alighting on the edge of the nest, the bird shuffles on to the shallow depression, carefully adjusting the huge webs of both feet over the egg until it is completely concealed from view. The body is then lowered over the feet until the breast feathers but barely cover them, giving one the impression that the bird is not sitting sufficiently far forward on the nest. From this habit the eggs, originally chalky white, soon become stained and discoloured."† How far this covering or clasping of the egg assists in incubation must remain a matter of doubt, but it is a suggestive coincidence that the Gannet is without the bare space usually termed at hatching-spot, or brood-spot. This, however, is also lacking in the Cormorant and Shag, which I believe do not put their feet on their eggs when incubating them, so there cannot be much in the coincidence. One would think that much warmth could hardly be afforded to the egg by the application of two large webbed feet, in which there could be no heat-generating arteries, but they may be of assistance in retaining an even temperature, which is all-important.*

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* "Rough Notes," Vol. III.

† "The Scotsman" of June 28th, 1910.

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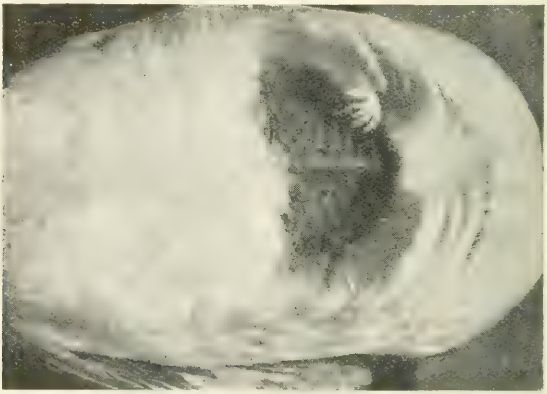
* I have searched, but quite in vain, for signs of a hatching-spot in five or six dead Gannets, and in as many live ones, and to make quite sure that there really was none, Mr. Thomson, of Ailsa Craig, caught by means of a snare and a bamboo fishing-rod, and carefully examined, twelve more, which he afterwards released. The fact is not new, for its absence was long ago pointed out by the accurate Faber. (*See* " Prod. der Isanischen Ornithologie," 1822, and " Ueber das Leben der hochnördischen Vogel," 1826.) To see how large the hatching-spot is in some sea-birds it is only necessary to examine the breast of a Common Guillemot (*Uria troile*). It may not be amiss to give an illustration of one, with the feathers pushed back on the lower breast, from a photograph by Mr. A. Fieldsend : whether the bird pecks off the feathers itself, or whether they, and also the down, drop off, is hard to say. In another Guillemot, which was incubating when examined, the hatching-spot was about the same size.



BREAST OF A GUILLEMOT.

Duration of the Incubatory Period.—The incubation of birds is a subject which had been greatly neglected until, in 1890, it was taken in hand by Mr. William Evans, of Edinburgh ; but, thanks principally to him, we now know much more about the period of its duration in different genera of birds than was formerly the case. What we know of the Gannet is briefly as follows :—

First, an egg laid on April 22nd, 1910, at the Bass Rock, and inscribed by Mr. Campbell with the date, was hatched on June 5th—forty-four days."*

Secondly, Mr. E. T. Booth puts the incubating period at from forty-three to forty-five days, taking his data from the young ones bred in his garden at Brighton. †

Thirdly, Mr. W. Evans puts it at rather less, a Gannet's egg which he put under a hen having hatched on the thirty-ninth day, while another had a live chick in it on the forty-second day.‡ Forty-two days agrees with the opinion entertained by the Rev. Neil Mackenzie of St. Kilda,§ and also with that of the German naturalist Naumann‖, and this may undoubtedly be accepted as very near the truth.*

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* "The Scotsman," July 25th, 1910.

† "Rough Notes," Vol. III.

‡ "Ibis," 1891, p. 69.

§ "Annals Scot. Nat. Hist," 1905, p. 144.

‖ "Nat. der Vogel," XI., p. 44.

Although the end of June is the Gannet's normal time of hatching its eggs, most of us have seen young ones which certainly had not escaped from the shell before quite the end of July; on the other hand, a few may be exceptionally early, for Mr. Booth mentions a young one which had been hatched, at the Bass Rock on May 10th.† On August 29th, 1906, there were plenty of young Gannets about two-thirds grown at the Bass Rock, which still had downy necks, as well as some which were as big as their parents, besides a few which could not have been more than twelve days old, and there was no reason for thinking that this was not a normal breeding-season.

There is one more point deserving of mention. Mr. Thomson, of Ailsa Craig, whose experience of Gannets is second to none, thinks that to assist incubation these birds when sitting expand their air-cells. There certainly is some appearance of inflation when a Gannet is on its nest, and a corresponding compression of plumage, I believe, when it rises, which gives some colour to this idea, but nothing else can be advanced, that I know of, in corroboration of their being possessed of such a power.

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* The incubation of the Australian *Sula serrator* is supposed to last only thirty-three days (*see* "Birds of New Zealand," II., p. 181), while in the Cormorant (*Phalacrocorax*) it is only twenty-eight (*see* "The Field," April 22nd, 1882). In the Pelican it is said to be about forty-nine days ("Zoologische Garten," 1872, p. 264), which is a week longer than the Gannet. No bird was known to Mr. Evans, of which the period exceeded sixty days, and that only in the case of the Ostrich.

† In 1909 Mr. J. Campbell saw a young one at the Bass on May 15th and in 1910 he had seen three by the 23rd of that month.

It was long ago stated by Martin,* and subsequently proved by Mr. Booth,† that the male and female Gannet take turns in sitting, and there is no proof of one doing a larger share of incubating than the other. There are some species of birds in which all the incubating is done by the male, and probably very few in which that sex takes no part whatever in it.

In conclusion it may be convenient to mention the principal plates of Gannets' eggs in works on Oology.

PLATES OF THE EGG.

HEWITSON.—"British Oology," plate xxxiv. (1836); "Eggs of British Birds," plate cxvi. (1845 ?); Ditto, 2nd edition, plate cxxx. (1856).

THIENEMANN.—"Systematische Darstellung der Fortpflanzung der Vögel Europa's," Heft 5, p. 43 (1838); "Fortpflanzungeschichte der Ges. Vögel" Tab. xciii. (1856).

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* "Voyage to St. Kilda," p. 50.

† "Rough Notes," Vol. III.

Badeker.—“ Die Eier der Europ. Vögel,” Tab. xxxviii. Here the irregularities in the egg’s chalky covering are well shown.

Seebohm.—“ History of British Birds,” plate xxxiv.; Ditto (abridged edition, 1896), plate xix.

Blasius.—Jubilee edition of Naumann, N. d. V. M.,Vol. XI., xli. Four illustrations are given, showing all the creases on the egg, and dirt stains.

Rey.—“ Die Eier der Vögel Mitteleuropas,” Vol. I., p. 61, and II., p. 107. Four illustrations showing dirt marks and scratches.

Dresser.—“ Eggs of the Birds of Europe,” Part xv.

CHAPTER XIII.

THE NESTLING.

Hatching and Rearing of the Nestling—Young Gannets and their ways—The Periods which make up a young Gannet's existence.

The Nestling.—An admirable account of the successive stages in a young Gannet's life, from its earliest growth onwards, is given in Booth's "Rough Notes on Birds."* These day-by-day memoranda were principally taken from one bred on an artificial pond in Mr. Booth's walled-in garden at Brighton, where I had the pleasure on two occasions of being introduced to his live birds, but do not distinctly remember the young Gannet. A short quotation may be made from the journal kept during the interesting period of this nursling's juvenescence :—

"30th. [June, 1880.] The glimpse that was obtained of the [Gannet's] egg showed that it was cracked and chipped. July 1st. In the morning, the young bird (a small black shapeless monstrosity resembling a toad) was partly clear of the shell, and fully hatched by mid-day. The female had apparently not left the nest for several days. 2nd. The male Gannet mounted guard on the nest, and both remained side by side till night. I noticed the young one stretching its small naked wing-joints while the parents were shifting positions over it. 3rd. One of the old birds plucked a number of feathers from its back, placing them carefully on the nest. This was a somewhat useless proceeding, as, on flapping its wings shortly after, the whole were blown away. 7th. Both old birds sitting on the nest. The young one now showed the eyes open : iris, dark hazel ; eyelid and circle, livid slate colour ; beak, a dull slate, white at the point ; a slight sprinkle of down on the head. . . . 9th. Young Gannet very noisy, squalling in the most vigorous manner. The old birds were feeding it on several occasions when visited. 10th. The down on the nestling increased on the head, and sprouting all over the back. The beak was now about three-quarters of an inch long."

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* Vol. III. (1883).

For comparison with this account, I am able to give the following, supplied to "The Scotsman"* by Mr. Campbell :—"· · · On the 5th June the young Solan was seen emerging from the shell . . . The young bird, on making its exit from the egg, appeared to use at first the little horny excrescence on the tip of the upper mandible for the purpose of rupturing the inner membrane, mere pressure being afterwards sufficient to chip the shell. This is invariably effected at the broad end, a little deeper than one would cut a breakfast egg. The chipping was continued slowly, bit by bit; first a small portion of the tough membrane was ripped, then the opposing shell pressed out. After a short rest, the bird wriggled a little further round—the bill always in view—and again renewed the attack, until fully two-thirds of the circumference had been cut. The claws of one of the feet now made their appearance over the lower edge of the fracture, and, by dint of pressure of the whole body, the remaining third of the shell was snapped, and out tumbled a black, sprawling object, helpless, blind, bare as the palm of one's hand, and whining like a puppy dog."

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* July 25th, 1910.

Under normal conditions a nestling Gannet emerges from its egg at the end of June, blind and bald, with small feet, a large head, and mouth of a dark bluish-grey, and, as stated in the preceding extracts, in twenty-four hours it has gained strength enough to stretch its wings; on the eighth day its eyes are open, and by the ninth it can squall vigorously.* For the first week of its existence it is treated as an egg would be, by its parents, that is to say, it is sat upon as though it had still to be incubated, except at feeding time. Until it is time to quit the ledges, its growth continues to be very slow. The nutriment supplied to the nestling at this early stage is in a soft—almost a liquid—state, which the old Gannet hardly has need to throw up, as it is secreted but a few inches down the gullet, where the nestling readily reaches it.* In 1904, towards the end of July, I had an opportunity of seeing what this half-digested fish-pulp was like, for an old Gannet, which I picked up under the walls of Tantallon Castle, which some thoughtless person had shot, had its gullet stuffed with it.†

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* A young Pelican (*Pelecanus erythrorhynchus*) can make a noise much sooner than that, according to Mr. F. M. Chapman's observations in "Bird Studies" (p. 207), for it begins "to bark" as soon as it has made an opening in the shell.

As I have never had a chance of watching the feeding of a nestling Gannet in a wild state, I will quote what Mr. Booth has to say about the young one which he bred at Brighton :—" The old bird, for a few minutes before commencing [to feed its young one] gave evidence, by certain movements in the neck, that the food was being prepared and gradually brought up. The nestling was calling faintly, and lifting up its head open-mouthed, when the old bird dropped forward, and, opening the beak to an enormous extent with the head drawn sideways, apparently scooped the young one into its mouth." In another passage he repeats these particulars, adding that the old Gannet stretches down its head sideways, and completely conceals the nestling, whilst it is being fed.

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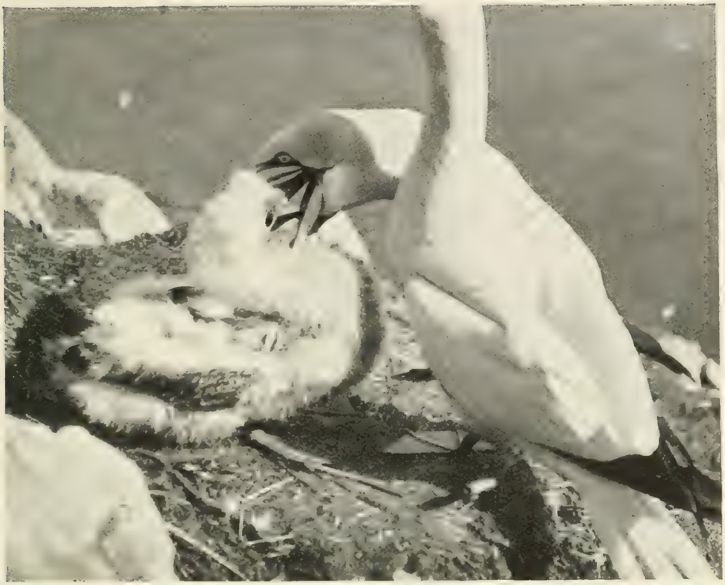
* This was well known to Martin, *see* "Voyage to St. Kilda," p. 50.

† It is well known that many birds besides the Gannet prepare food for their young by a process of partially digesting it themselves, as well as by the addition, as is supposed, of some hidden nutritive substance which is secreted in their alimentary system. The nestling Pelican (*P. onocrotalus*) receives nutriment in this way (Van Bemmelen, in "Zool. Garten," 1872, p. 264). So do *P. crispus* (R. B. Lodge, "Zoologist," 1906, p. 367), *Phalacrocorax carbo* ("P.Z.S.," 1882, p. 458), *P. graculus* ("Bird Watching," 1901, p. 178), and *Sula cyanops* ("The Condor," 1904, p. 89), and probably the other Boobies. There are several species of land birds to which the practice is common, in a less degree than those here mentioned. In Pigeons the regurgitated food is supplied to the young in a milky secretion.

Mr. Booth does not give any clue to the hour of the day at which the young Gannets are fed, perhaps it varies according to weather, but Mr. J. Laidlaw is of opinion that it is most often early, and what confirms him in thinking so is that if the young are made to disgorge before 10 a.m., the fish thrown up are generally fresh ones. The following observations are some of several which were obligingly taken by the Rev. H. N. Bonar, at the Bass Rock, for the use of this work which bear on the point :—

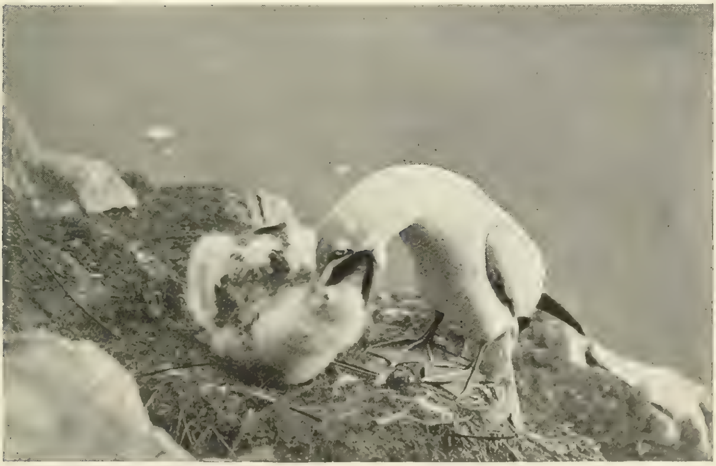
" Notes on Gannets, July 13th, 1910. Set down camera at west gannetry, getting two parents with their young in focus on the same plate. The best grown one (A) was perhaps a month old, the smaller one (B) perhaps a fortnight. Whilst I was focussing, the parents never left the young. A disgorged a great mass of half-digested sand-eels, then in twenty minutes it grew restless, and began to try and eat some of this food again, but it took very little. It rested awhile, then faintly pecked at its parent's throat and bill, as if asking for food, but the parent made no response. Then it slept in all sorts of grotesque attitudes, the parent meanwhile standing or sitting to seaward of it. The parent sometimes stood back a little, and waved its wings as if fanning the chick. . . . but no attempt was made to feed the young one, which every now and then barked and yapped like a puppy, for no particular reason. The younger of the two Gannets under focus (B), was much feebler, and lay prone most of the time I watched (nearly six hours). The parent sat sheltering the young one from the sun, and often sat on it. B never clamoured at all ; A only very rarely squeaked faintly . . . On the ledge where I watched there were ten young Gannets, which I kept under observation from 11.40 until 5.20, and not one of these was fed during the time I was there. The lighthouse keepers say that they are mainly fed in the early morning."

By dint of going down a hundred and fifty feet on a rope with half a hundred-weight of impedimenta on his back, and lying motionless for hours among the nests, Mr. Campbell has succeeded in getting photographs of the feeding process, which show the young Gannet's beak some way down the



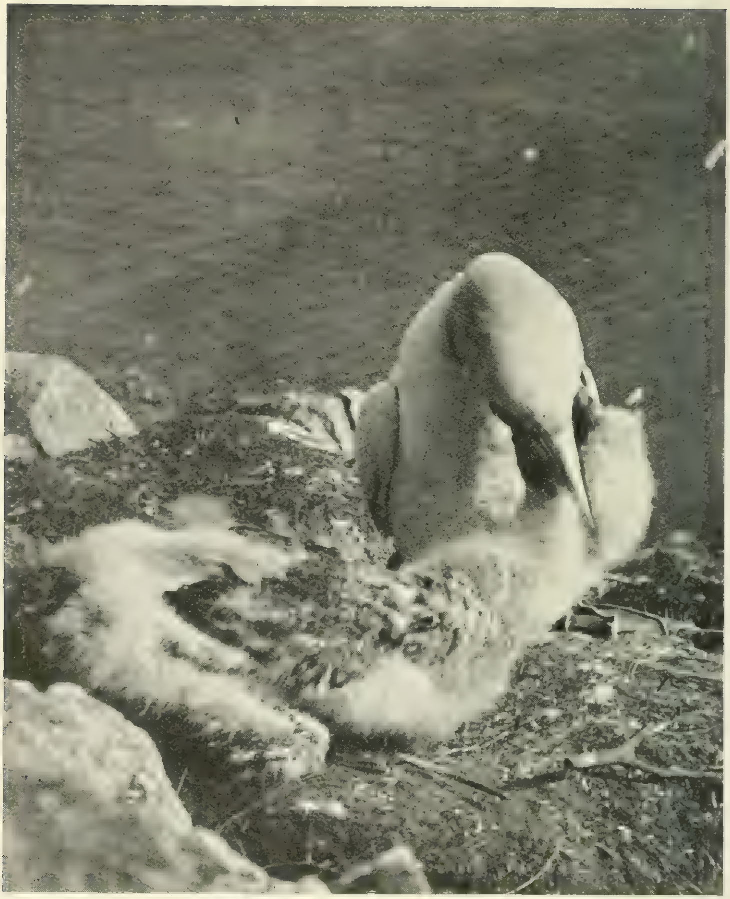
[*J. M. Campbell, Phot.*

NESTLING BEING FED.



[*J. M. Campbell, Phot.*

THE SAME NESTLING BEING FED.



[J. M. Campbell, Phot.

THE SAME NESTLING BEING FED.

mouth of the old one, from which it is deriving nourishment.

As the young Gannets get bigger, the parents continue to bring fish to the ledges in increasingly large quantities. This bringing home of supplies goes on all through July and August, but anyone who merely observes the old birds from a distance would think they were returning empty-handed to their nests, as no fish, or signs of fish, are visible when they are flying. This part of the proceedings of the parent Gannets is also very well described by Mr. Booth, who says —"The whole of the food carried to the Rock is swallowed when caught, and afterwards disgorged either on or close to the nest. The pieces of fish, which are thrown up, whether whole or in fragments, are again greedily devoured with much clamour by both parents. When their meal is partially digested the young bird is fed. . . . In the half-rotten mass of fish on some of the ledges it is easy to recognise the result of each catch lying in the shape in which it was disgorged. Half a dozen herrings or three or four mackerel may commonly be noticed neatly and compactly wedged together. In some instances the heads are partially digested; this probably occurs after a protracted journey in quest of food. As many as half a dozen such parcels of fish are at times to be counted round a single nest."*

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* "Rough Notes," Vol. III.

It has been proved that both sexes feed the young.*

What a young Gannet is like in the first or early nestling stage is here shown by a coloured plate of a very young one, of which the down, it will be seen, has already begun to grow, indicating that it is of the age of about four days. The painting was in the first instance taken, in 1865, from a nestling while still alive, by Dr. R. O. Cunningham (to illustrate his valuable article before referred to), and subsequently repainted by the celebrated artist Joseph Wolf.† It will be observed how distinctly this picture shows the bluntness of beak, which is a character of the Gannet-chick when hatched. It also just shows the scale or nodule at the end of the upper mandible with which the nestling probably prizes open the egg. This little scale, which has been termed an egg-tooth, is very tough and does not fall off until the young Gannet is as big as a pigeon, or bigger, although no other use is made of it, that we are aware of.

I spent a good deal of time watching the young Gannets in their nests at the Bass Rock. Some of them lay so still, and in such prostrate attitudes, with neck stretched out and

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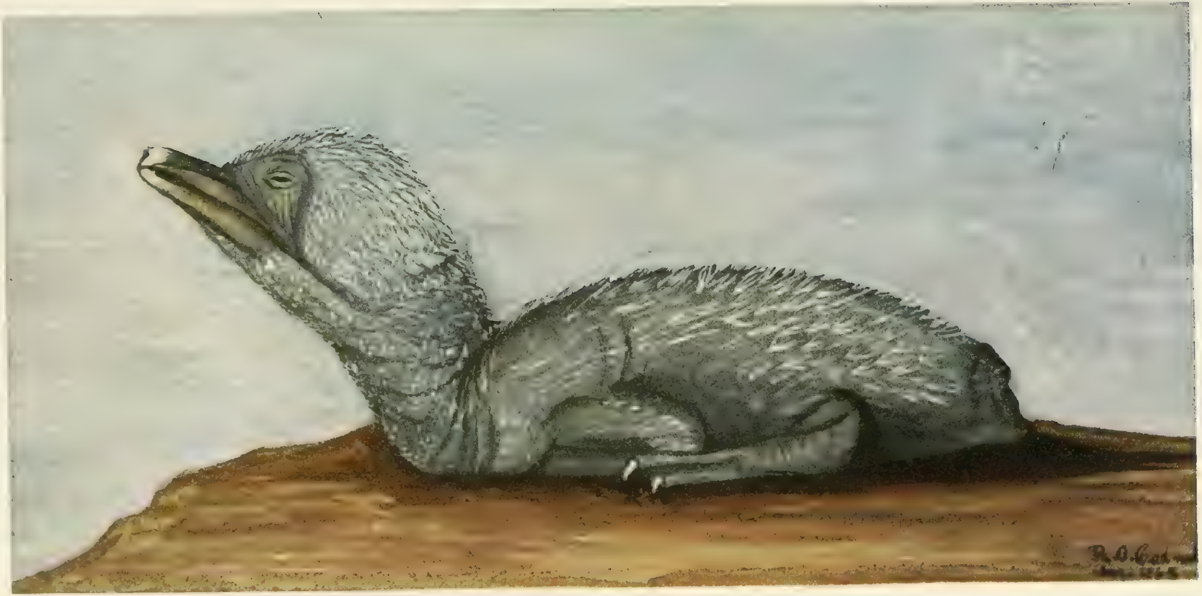
* *See* p. 60.

† For "The Ibis" (1866, Pl. I.). The original was given to me by the then Editor, Professor Newton, and is reproduced with the sanction of the President and present Editor.



NESTLING GANNET, ABOUT FOUR DAYS OLD.

[*Face page 368*]

stiffened body, that they gave the impression of being dead. However, such was far from being the case, although I really thought some of them were lifeless at first ; but the weather was very hot, which unquestionably affected them. In June, 1910, Mr. Campbell found that several fledglings, a few days old, which had been exposed by the temporary absence of their parents, actually did expire from the effects of sun. The care bestowed by almost every species of bird upon its offspring has long been proverbial, but it would seem that the Gannet is an exception to this rule, for although it never forgets to feed its one nursling, it is not at all unusual to see an old Gannet stand over and peck it ; but the young bear this hard treatment in a patient and uncomplaining manner, and it is said never utter a sound. Sometimes they actually stand upon their young ones, which their webbed feet are so big as very nearly to cover, but this may be the instinct of protection administered in a rough form, to conceal them from large Gulls which are suspected of occasionally taking a young one. As an old Gannet weighs about six pounds, it is a wonder that they are not pressed to death !

Young Gannets and their Ways ; the Second Stage.—When the young Gannets are twelve or thirteen weeks old. instinct tells their parents that they are quite fat enough for their own good, and that any more stuffing with fish will make them too unwieldy to fly.* Accordingly it would seem that they desist from feeding their young for the last ten days before they quit the ledges. This is in accordance with repeated observations made by Mr. Laidlaw, and his theory is by no means without confirmation, particularly in the case of the young one bred at Brighton by Mr. Booth, which was never fed after it had passed the age of thirteen weeks and three days. As a matter of fact, it must be an exceedingly necessary precaution, for if too heavy, the young Gannet, when it launches itself for the first time into space, would often not get clear of the rocks. When the day comes for the mighty plunge to be made, spreading wide their great sails of wings, the young Gannets may be seen to half fly, half fall, into the abyss below. This does not take place until the month of September has commenced, and then numbers of them are to be seen quitting the safety of their ledges. A singular, not to say absurd sight, it is to stand, as my son and I did, on the Bass Rock and watch their awkwardness and hesitation, like that of a timid human bather about to take a first header into the water! I reckoned, when I was there in 1906, that between August the 29th and September the 4th, two hundred and fifty young Gannets made the plunge, and with it took their departure from the Bass Rock. It happens occasionally that some retarded individuals are much later in going away from their ledges than September, though that is the usual month ; in 1904 the Rev. H. N. Bonar tells me that there were a few young Gannets still unable to fly on November 9th, which was very exceptional. On the other hand I have known a strong flyer, which must have lost its way in a fog, to be picked up in Norfolk on the 2nd of September—a bird which, judging from its appearance, must have left the Bass Rock about August 17th, and Mr. R. L. Patterson mentions a still earlier one on August 22nd, off Belfast.*

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* It is stated that they are sometimes quite lean at St. Kilda, after spells of rough weather.

For some days before their actual departure the young Gannets may be seen continually flapping their long black wings, which is done, it is to be presumed, to relax the joints and strengthen the ligaments ; ten or twelve young Gannets may be viewed going through this performance at the same time on the ledges. Notwithstanding so much preparation some make a bad start, and I was told at Ailsa Craig, where there is a belt of rock-strewn shore to be crossed, that they not infrequently fall on to it. In squally weather others lose their balance, and are carried by a gust of wind down into the sea before they are ready. But even if they do meet with either of these mishaps, they are not necessarily left to die, for old ones—very likely not their own parents—will sometimes provide for them. A young Gannet which some visitor to the Bass Rock had carried to the landing-stage and thoughtlessly left there, was seen by Mr. Laidlaw to be fed by an old one.

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* "Birds, Fishes, and Cetacea of Belfast Lough," p. 51.

The flight, or rather descent, of the young Gannet from its natal ledge, is a very unsteady performance, yet on the whole it is well sustained, so that the bird has probably achieved a distance of half a mile before the final descending curve into the sea takes place, which ends with a mighty splash, caused by impact with the water. The στοργὴ, or natural affection, of which Gilbert White wrote so eloquently, is now past and over, and the young one must shift for itself as best it can in the world of waters. When once launched, the young Gannet is comparatively safe, except that it is now in some measure at the mercy of the tide. In the sea it remains, drifting hither and thither for the space of two or three weeks. It is apparently unable to rise from the water, and all evidence points to its receiving no food whatever, except the sustenance contained in its own subcutaneous layer of grease, which is considerable enough to impart nutriment to the rest of the body.*† Besides the tide, it has to reckon with any high wind, but September is generally a tranquil time of the year, and young Gannets from Ailsa or the

[J. M. Campbell, Phot.

GANNETS WHICH HAVE NOT YET FLOWN.

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* There are other sea-birds which subsist in the same manner. The young of *Puffinus brevicauda* and *P. anglorum* are believed to do so. When the Cape Penguins (*Spheniscus demersus* (L.)) come up from the sea, they are so enveloped in fat that they require nothing to eat until their moult is over ("Three Voyages of a Naturalist," p. 161). In the same way it is said that Albatrosses when young are so portentously fat as to be able to subsist four or five months without food being given to them.

† Mr. W. Evans tells me of a young Gannet taken from the Bass Rock, August 13th, 1897, which ate nothing for nineteen days. Mr. Booth mentions another which fasted fourteen days, and would have gone on doing so longer.

Bass soon work their way out to sea. Sometimes, however, it happens that a few are caught by a suddenly rising breeze, and "when," says Mr. Booth, "a gale from the north-east comes on shortly after a number of young have left the [Bass] Rock, they are all blown ashore, being unable to make headway against the force of the wind and sea." Such mischances however, are not common, and do not necessarily entail death, if the sea moderates.

Having reached the sea, we shall be safe in assuming that the young Gannet will be nearly four months old before it voluntarily essays a second flight. Even this is much less than is the case with the young Albatross.* Then a new phase of its life begins, it rises from the water with a newly-found power, henceforth to find its own livelihood by those beautiful plunges which are the admiration of all who see them.

The juvenescence of the Gannet lasts a very long time compared to that of most birds, he whole period from the laying of the egg to the flight of the young bird from the cliffs, generally occupying about nineteen weeks, and from the hatching of the egg it is ten weeks.[*] What a contrast is this inertness to the activity of some nestling birds.[†]

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* It is stated to be ten months before a young Albatross knows how to fly at all (Eagle Clarke, "Ibis," 1905, p. 264).

Assuming that the egg was laid on May 15th—an average date—that incubation commenced on the 19th, and that it was hatched on July 1st, the young Gannet's life is made up as follows :—

Hatched	on	July 1st.
Able to see	,,	July 8th.
Covered with down	,,	July 11th.
Wing feathers begin to shoot	about	July 21st.
Skin very loose	,,	July 31st.
It begins to put on fat	,,	July 31st.
Fit to kill for eating	,,	August 25th.
No longer fed by parents	,,	August 30th.
Flies off to sea	,,	September 9th.
Begins fishing	,,	September 25th.

The young are fit for taking to eat at the age of seven or eight weeks, and used to be gathered at the Bass Rock in August, by which time young Guillemots and Kittiwake Gulls are on the move, or gone.

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[*] The period from the hatching of the egg to the voluntary departure of the nestling which has been termed "the Fledging-period,"—not given in any of the works to which I have access,—is twenty-eight to thirty days in the Sparrow-Hawk, thirty-three to thirty-four in the Carrion-Crow, twenty-nine to thirty in the Magpie, twenty-one to twenty-two in the Starling, thirteen to fourteen in the Song-Thrush, twelve to thirteen in the Hedge-Sparrow, and eleven in the Whitethroat, according to Mr. S. E. Brock's observations ("Zoologist," 1910, p. 117). In the Cuckoo it is twenty days.

[†] The young of the Brush Turkey, for instance, which can fly the day it is hatched (St. Quintin, "The Naturalist," 1910, p. 163). All Megapodes are remarkable for the highly developed condition of their young at birth.

CHAPTER XIV.

HABITS OF THE GANNET.

The Gannet's affectionate Disposition—Its frequent Habit of Gaping—Its Cries—an imitation of the Elements—Its hours of Sleep—Its sense of Smell.

Gannets' affection for one another.—Allusion has already been made in the preceding chapter to the hard treatment meted out to young Gannets by old ones which sometimes are and sometimes are not their parents—a treatment nearly as unnatural as the behaviour of *Megalestris maccormicki* to its young*—as well as to the fights which go on among the adults themselves. That there should be fighting and jealousy in a common community is not invariably one of the conditions of bird-life, even where nests are close together, but it is not absent at the Bass. However, their struggles generally end as abruptly as they began, and are quickly forgotten; the Gannets which were fighting before being very soon good friends again.

Perhaps all birds are capable of affection, more or less;

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* "Nat. Antarctic Expedition," N.H., II., p. 64 (1907).

that Gannets are so in a marked degree seems undeniable. This is confirmed by several observers. Mr. Mattingley has recorded it of the Australian Gannet.* The following is Mr. Kirkman's account of the greeting which a Gannet was seen to give to its expectant mate on returning to their joint breeding-ledge at the Bass Rock. "It seems to have inexhaustible affection, and inexhaustible energy in manifesting it; at the end of the season its ardour is as strong as at the beginning, and its mate is no whit behindhand. For over a minute a pair might be seen, the two birds face to face, wings slightly raised, their necks stretched upwards, either strenuously wagging their heads from side to side, or, if closer together, clacking their beaks like castanets." As another Gannet was moving away from its mate, continues Mr. Kirkman, "the latter took occasion to show her affection by gently preening his back feathers. The retreating bird at once stopped, unbent, curved its neck gracefully backwards, and then followed an interchange of most lover-like caresses."† This sort of thing can be seen, with variations, any fine day in July, on the Bass Rock, but it cannot be the affection of courtship, because the courting season is passed. Even so late as September 19th, Mr. W. Evans has watched many pairs going through the billing and head-shaking performance. The preliminaries of courtship, which usually accompany sexual activity, are not so noticeable in the Gannet, as in many species of birds, yet Mr. Selous has shown courtship to be strongly developed in the Shag and the Cormorant.*

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* *Sula serrator*, "Victorian Naturalist," XXV., p. 19.

† F. B. Kirkman, "Pall Mall Magazine," 1910, p. 595.

Frequent Habit of Gàping.—Although so much has been said about the Gannet's habits, there are still several more points in the economy of this extraordinary bird, without a reference to which no account of it would be complete. Anybody who takes up the fascinating work of bird-watching knows how many little things there are, trivial in themselves, but yet which one does not like to pass over, because they are all parts in the life-history and manners of the bird under study. In the Gannet one of these is a singular action, which is not a very intelligible one, and that is their habit of gaping. Frequently an old bird may be seen opening wide its mandibles, whilst seated on its nest—giving a regular gape with them ; and this is usually accompanied by another mysterious performance, which is a shaking of the head rapidly from side to side. The gaping may be conjectured to be due to the want of nostrils, and the effect of heat combined ; for I have often noticed how my tame ones used to suffer in summer—especially if the day was very sultry—and how they would sometimes sit with their beaks open, as if that gave them relief in breathing. It is not the old Gannets only which gape; young Gannets from one-third to two-thirds grown, are to be seen continually gaping in warm weather, as if they also were greatly oppressed by it. But there is another possible explanation of their habit of gaping: it will not be considered to be too far-fetched to suppose that it may be done sometimes by old birds with a view of displaying the colour of the palate to the opposite sex.*

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* "Bird Watching" (1901), p. 167.

The Sounds uttered by Gannets.†—Some have thought that the cries of birds are the effect of environment, others deem they can detect in them an imitation of the elements, and certainly there is something in the *kirra kirra* of the Gannet, and the plaintive *kittawee* of the Kittiwake Gull, which harmonizes with the noise of the wind and the lapping of the waves. As one stands on the giddy precipices of the Bass Rock, the babel of sound rises and falls, now loud, now faint, but very seldom is it entirely suppressed ; but it is not all due to Gannets. Indeed, the Gannet is by no means a noisy bird, when undisturbed. Nor is it a shy one where their nests are protected ; at the Bass Mr. Selby found they would "allow themselves to be stroked by the hand without resistance, or any shew even of impatience, except the low guttural cry of *grog grog*."* This I can quite believe although such confidence in man is soon lost. It has been held that the cry of a Gannet can be rendered by the words *karra karra krae krae*, but that leaves out the first note ; Professor MacGillivray was not far from the mark when he likened the strident torrent of sound to *varroch varroch kirra cree cree krak krak*. By Mr. F. B. Kirkman the cry has been syllabled thus :—"*Urrah, urrah*, or *wrow, wrow, wrow*," and at times "*yow ouuu*," or a long-drawn high-pitched "*yee-orrrrr*," according to the circumstances under which it is uttered.† Inflection is its characteristic, as much as sustained utterance;

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* Display is a prominent characteristic of many birds, and for ought we know the Gannet's black mouth may be a sexually attractive colour. *See* observations by Mr. E. Selous, who remarks on the opening of the bill by Cormorants, whereby the yellow of the mouth is exhibited ("Zoologist," 1907, p. 238; 1908, p. 191. "Bird Watching," p. 169.) But, as Mr. Harvie-Brown remarks (*in litt.*), other birds besides Gannets and Cormorants gape; Pelicans do ("Zool.," 1906, p. 368), as also Reptiles and Batrachians ("Zool.," 1910, p. 384), human beings and dogs.

† The Gannet's loud notes have not escaped the attention of the poets, one of the earliest of whom, John Skelton, in "Phyllyp Sparowe" (1508) versifies—

> ". . . the gagling gaunte
> And the churlish chouge."

In Pennant's time "Gaunt" was a Lincolnshire name for the Grebe ("British Zoology," II., p. 498), but here Skelton probably means the Gannet as two lines before he mentions "the Cormoraunce": on the other hand, the *duas gantas* of a tenure in Edward I.'s reign referred to on p. 24 were probably domestic geese, *Ganta* being elsewhere used for geese.

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* "British Ornithology," by P. J. Selby, II , p. 457.

† "Pall Mall," 1910, p. 597.

however, there is nothing remarkable about the Gannet's windpipe, from which these hoarse sounds proceed. Nor is the syrinx, which is considered to be the voice organ of birds, specially developed.* Gannets have another softer note, already alluded to, which is rendered *grog grog*, and, according to the historian of St. Kilda,† when they utter this, it means "all safe, no cause for alarm," and on hearing this welcome intimation from the sentinel, his companions feel themselves at liberty to go to sleep again.‡ Gannets have no call-note for their young, they have no need of one.§ Whether the notes of the same species of birds are alike in all countries is an open question. To Mr. Bent's ear the Canadian Gannets seemed to say "*kurruck kurruck*," which is not very different from the rendering we have just had of the voices of British ones.

It may be added that the noise at a Gannet's breeding-place is by no means all vocal, for a great deal of sound is produced by their wings, of which the listener is very conscious when one of these great birds comes swooping overhead, causing the wind and its own pinions to be brought into sharp contact, resulting in a loud vibration.*

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* The Syrinx of a Gannet is figured in "Proc. Zoological Soc.," 1876 (Plate XXVIII.).

† Martin, "Voyage to St. Kilda," p. 53.

‡ This the Rev. Neil Mackenzie confirms ("Ann. Scot. Nat. Hist.," 1905, p. 146).

§ Guillemots, on the contrary, continue whistling to their young until they are three parts grown, and so loudly as to be audible a long way off on the water.

The Sleep of Gannets.—The sleep of birds is not a subject which has attracted much attention, but all birds presumably do sleep, and it can hardly be doubted that soaring birds sometimes sleep on the wing, the Gannet among the number.

GANNET ASLEEP.

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* One of the most extraordinary sounds produced in this way is the resounding " whish " which a Puffin makes when it comes down from the top of a lofty hill like Ailsa Craig. Divers (*Colymbi*), says Professor Newton, also will descend from a height with a noise like thunder ("Dictionary of Birds," p. 153).

In summer-time Gannets which are not engaged in incubating, sleep soundly by night on the ledges, but whether they ever sleep on their nests—as Albatrosses, for example, are known to do—is uncertain, but quite probable. They have an uncommonly snug way of tucking their heads into the feathers of the back (as seen in the photograph*), which seem to part in a natural division on purpose. Judging from the Gannets I have had in confinement, I should say that their hour for slumber was about half-past eight in the evening in summer, and seven o'clock in the winter. They evidently are not such early risers as the Guillemots and Kittiwakes. "Before day-break," says Mr. Booth, "I have on two or three occasions climbed to the summit of the Bass, and looked down on the silent multitudes collected on the ledges, while the first rays of the rising sun lit up the scene. In almost every instance the male and female were sitting side by side on the nest, the young, if small, being hidden from view, and those of larger size in most instances snugly nestled between the parents. As the daylight increases, first one and then another stretch out their necks, and uttering a low note, rise up and flap their wings."†

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* By Miss M. E. Gurney, from an unpinioned bird on a pond in Norfolk.

† "Rough Notes."

Senses of Smelling and Hearing.—Neither of these senses is much developed in the Gannet; at least I cannot believe, judging from the behaviour of those I have watched in confinement, that Gannets can detect a fish, either dead or alive, by scent alone. They rely on their sight, which is marvellous, and not on their nostrils, for they scarcely have any, and the nasal glands, if they exist at all, are very small. Xavier Raspail, who has written a treatise on "Le sens de l'odorat chez les oiseaux," details "observations which indicate the sense of smell to be very developed in birds, putting them on guard in the presence of danger, as well as permitting them to discover food which they could not see," and as the result of careful enquiries he concludes that "Birds are endowed with the sense of smell to a degree at least equal to that of a dog" ("Bulletin de la Société Zoologique de France," 1899, pp. 95, 102); but he does not tell us that he made any experiments on sea-birds, which may not at all possess the same power as land-birds. Petrels, however, have a large olfactory chamber, and the Fulmar is known to be guided by scent. Mr. J. Collins found that *Puffinus major* and *Cymochorea leucorrhoa* could easily smell liver in a fog ("Report of the Commissioners of Fish," Washington, p. 317).

Neither do I think that Gannets can hear as well as other birds, for it is easy to steal upon them unawares.

The orifice of the ear in *Sula bassana* is covered with feathers, and is very small, being externally only .09 of an inch, and the size of the opening can be still further reduced by muscular contraction.

CHAPTER XV.

FOOD AND FISHING.

Habits of the Gannet continued—Its food—The amount of fish required—Its methods of fishing—by plunging from a great height—very different when feeding on a shoal of fry.

Food of the Gannet.—The Gannet is undeniably a bird of voracious appetite; that its best friends can hardly gainsay, and accordingly Nature has provided it with a wide and very dilatable œsophagus, the upper part of which can expand to a width of four inches, and the proventriculus is correspondingly large. It has besides a rapid digestion, which quickly causes all the food swallowed to be assimilated, thereby further increasing its requirements. Yet the interval of time between ingestion and copious evacuation may not be more rapid in the Gannet than in many other birds. Ever on the look-out as it flies along, little that is in the waters escapes the Gannet's keen and searching eye. According to the latitude in which it finds itself, so does it readily adapt its taste to different sorts of fish, so that be it the sild of Iceland, the coal-fish of the Shetlands, the mackerel of British seas, the "sardine" of the

Mediterranean, or the widely-diffused herring, nothing comes amiss. Whilst giving preference to a fish six or seven inches long, a hungry Gannet will readily take anything up to a foot in length, and I have seen disgorged fish of that size lying in their nests. But Gannets are also not above seizing small fry of only an inch or two, not by plunging, but by gulping them up while swimming, of which an instance has been given already.*

There used to be some animosity towards the Gannet on the part of the fishermen of Cornwall, where the pilchard fishery has long been a very important industry—an animosity which in the seventeenth century found expression in the pages of Richard Carew, the Cornish historian, who, after mentioning the dog-fish, tunnys and hakes, by which pilchards are pursued and devoured, adds " . . . certaine birds called Gannets, soare over, and stoup to prey upon them."† Like Carew, the Essex naturalist John Ray, who made a journey to Cornwall in 1662, did not receive a favourable report of the Gannet, of which in his journal he remarks :—" We saw many of those birds which they call gannets, ... He preys upon pilchards, the shoals whereof great multitudes of these fowls constantly pursue."‡ Nowadays fishermen in

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* *See* p. 104.

† " Survey of Cornwall," 1602 (Ed. 1769, p. 34).

‡ " Memorials of John Ray," p. 188.

Cornwall, and in other maritime counties, realise that Gannets can be of great use occasionally by indicating the whereabouts of fish, so this has to be set off against their demerits. One of the first to put this fact down to their credit was William Borlase, an observant eighteenth-century writer (*fl.* 1695-1772), who says: "As this bird is a never-failing attendant upon the pilchards, all concerned in the fishery make ready their seyns, nets and boats as soon as they see the Gannet, and can easily guess by its flight whether the shoals of pilchards are swimming deep underneath the water, or near the surface."*

Perhaps it will not be devoid of interest to give a list of the Gannet's bill of fare so far as authors record it, but I have not extended it beyond European seas. Unfortunately for them, it includes one fish, the gurnard (*Trigla*) which they appear to be rather fond of, whose spinous, dorsal-fin sometimes penetrates the walls of the throat, and sticking there is not infrequently fatal to them. Gannets never take flat fish.†

Herring, *Clupea harenga.*

Mackerel, *Scomber scomber.*

Coal-fish (sethe or saithe) *Gadus virens. Fide* J. A. Harvie-Brown and others.

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* "Journal R. Institute of Cornwall," 1864, p. 44 (Borlase's posthumous notes).

† In which respect they are unlike Cormorants, which are very partial to flounders.

Pollack (Lythe), *G. pollachius.* (But not at the Bass according to Booth.)

Codling, *G. morrhua.* *Fide* various writers.

Whiting, *G. merlangus.* *Fide* various writers.

Haddock, *G. æglefinus.* *Fide* R. Gray.

Power cod, *G. minutus.* *Fide* R. Gray.

Sand-eel, *Ammodytes lanceolatus.* *Fide* H. N. Bonar.

Salmon smolts. *Fide* Portmagee fishermen.

Sea Trout. *Fide* W. Evans.

Gurnards, of any species.

Garfish, *Belone vulgaris.* *Fide* W. Girvan.

Sprat, *Clupea spratta.* *Fide* E. T. Booth.

Pilchard, *C. pilcharda.*

Anchovy, *Engraulis encrassicholus.* *Fide* H. Saunders.

Cuttle-fish. *Fide* Portmagee fishermen.

As regards their food off North American shores, it is probably much the same as in Europe. I have no recent information, but Henry Bryant, writing of the Gannets at Bird Rocks in 1860, says :—" The birds were feeding principally on herring, but also on capelin filled with spawn, some fine looking mackerel, a few squids, and in one instance a cod-fish weighing at least two pounds."*

The Amount of Food Required.—With regard to the quantity of food which Gannets require, it is evidently very large, no one can watch them fishing without being satisfied of that, and if shot, four or five, or even six, fish may perhaps be found in their capacious gullets. Yet it is no larger in proportion than the quantity required by the Cormorant, Guillemot, Puffin, or Pelican (a large eater), only their mode of fishing does not bring them so directly under our notice. A Cormorant has been stated to require ten pounds of fish daily to keep it.* Surely there are as many fish in the sea as ever there were, and certainly it does not look much like a decrease in our fish supply when seventy-nine million herrings can be landed at one port on a single day.† The part played by sea-birds in keeping down fish is probably, did we but know it, just as important as the part played by birds-of-prey in keeping down the numbers of rats, and other prolific rodents, or that performed by the *Passeres* and *Picariæ* in keeping down insects. Scientific writers are in agreement that man should not try to upset the balance of Nature by shooting down sea-birds. On this head see the opinions entertained by the late Professor Newton‡ and Mr. W. P. Pycraft, the latter of whom thinks that the "blundering efforts made to-day by certain ill-informed would-be legislators to keep down fish-eating birds, on the ground that they lessen our food supply, fail of their purpose. For should they succeed in appreciably reducing the numbers of these birds, they will but give a fresh impetus to the shoals of predaceous fishes . . . and over these they have no control whatever."*

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* " Proc. Boston Nat. Hist. Soc.," Vol. VIII., p. 65.

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* "Field," Sept. 24th, 1910.

† *See* p. 10.

‡ "Dictionary of Birds," p. 303.

Those who hold the same opinion as Mr. Pycraft, and I confess I am one of them—viz., that to destroy fish-eating birds, on the ground that they lessen our food supply, is a mistake—will agree that the Gannet, for the part it plays in the great scheme of Nature, is a bird more worthy of protection than persecution.†

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* "A History of Birds," by W. P. Pycraft, p. 115.

† *Gannets in confinement.*—Here it may not be out of place to say a few words on the Gannets which I have at different times kept on my pond. Provided a good supply of fish is obtainable there is not much difficulty in keeping them in good health, but they are liable to swellings on the feet, which it is difficult to prevent. Mr. Booth had much trouble with this, but eventually chalk with short grass over it proved a safe exercising ground, and their feet recovered (*see* "Rough Notes"). If my birds were at all hungry, they were not to be satisfied with less than eight good-sized fish apiece daily, generally mackerel, whitings or herrings of half-a-pound. That was in the winter and spring, and if there was a sharp frost their appetites increased with it, and nine or ten herrings were none too much. But in the summer they became much less ravenous, owing I suppose to the warm weather, and then four or five fish were enough, and these were not eaten with the same relish as before. On one occasion one of these Gannets pouched twenty-two small roach, fresh from the river, in ten minutes, and obviously liked them very much, though it must have been a new dainty. The capacity of their gullets is enormous, so much so that they will admit a man's hand with but little extension, as I proved on a dead one. These Gannets could comfortably dispose of a mackerel seventeen inches long, for I have seen one of them do it, and a few minutes afterwards be ready

for another. One belonging to Mr. E. T. Booth swallowed a Guillemot, but soon threw it up, but it shows what they are capable of taking. These birds, being in confinement, had not the exercise of flying, which it is to be presumed would have further increased their requirements, nor did they often walk unless it was to meet the bearer of their daily rations. They would dive off a rock on the edge of the pond, but were never seen to dive when swimming, and if a fish sank to the bottom it was not recovered. In Booth's "Rough Notes" there is a long account of some Gannets kept on an artificial (cemented) salt-water pond at Brighton, where they laid several eggs, and even had two young ones, one of which was reared. I was told, when I went to see them, that these Gannets were sometimes clever enough to catch Sparrows, and on one occasion made short work of a pinioned Water-Rail. Pilchards they would not eat, perhaps because being Bass Gannets, which get most of their living in the North Sea, they were unaccustomed to them. Unfortunately my Gannets never nested, although a couple were twice shut off for that purpose, and supplied with seaweed, but they may not have been a pair. According to my experience no amount of frost or cold seems to hurt an old Gannet, although a young one may feel it. My tame birds would wake up quite happy after a night of 22 degrees of frost spent in the open (for they never would use the shed put up for them), and only display an extra sharp appetite, not being one whit the worse for the cold; but great heat they cannot stand. On a sultry day I have seen the poor birds sitting for hours with their beaks open, evidently much distressed by the heat, and breathing with considerable difficulty, which would be increased by their want of nostrils. Gannets are very fond of preening themselves, especially during, or just after, rain or melting snow, when their feathers are wet, or at any rate damp, for water rolls off them without penetrating. I find in my journal: "March 2nd, 1906. NNW. 1. Snow in the morning. After it had melted the Gannets in the enclosure did an elaborate preening of plumage in the water, and the Scops Owls hooted for some time." But it is not in preening only that they get enjoyment. They like also to try their pinions. I have often remarked what relaxation Gannets appear to find in stretching out and flapping their long wings, which no doubt get stiff for want of using. This, however, young Gannets will do in a wild state on the Bass Rock. There was one very odd performance in which they indulged on the pond, which consisted in rolling half-over in the water, with one foot beneath the surface, and the other extended in the air. These antics, which I considered a sign of health, were as often as not accompanied by a scratching of the head with the claw or claws, the middle one of which has a comb-like edge, perhaps to allay some irritation caused by parasites, of which Mr. William Evans has found on them four distinct kinds, *Ixodes putus*, C., *Docophorus bassanæ*, D., *Lipeurus staphylinoides*, D., and a *Lipeurus* not determined. Mr. Blake-Knox has seen Shags remove ticks with the serrated claw ("Zoologist," 1866, p. 251), and Gannets may do likewise.

Though marvellously long-sighted, Gannets appear to be unable to distinguish near objects on land, and will mistake a man's hand for a fish, when a few feet away. Adept enough at catching a fish thrown into the air, they are much less so at picking up a dead one when it lies in the water, even though hungry. Salted fish should never be given to Gannets or other sea-birds, under any circumstances. If fresh fish are not obtainable, liver from the butcher will do sufficiently well for a time.

GANNET CATCHING FISH THROWN TO IT.

I thought it quite unnecessary to pinion them, but found they were able to rise against a strong wind, and one day with a gale from the west two of them escaped from their enclosure: one was recaptured, but the other was last seen mounting over the trees in the park, and although advertised for was never heard of again, and I imagine it reached the sea.

The Gannet's Mode of Fishing.—Many water-fowl, like the Shoveler Duck and the Flamingo, obtain their food by the sense of touch; the Woodcock, which has a very sensitive and flexible beak, does the same. On the other hand, there are a few, but not many, which rely on their olfactory organs; while the Owls are provided with large ears and noiseless wings, because they secure their prey by hearing. But the Gannet is typical of those birds which get their food solely through the medium of sight, with which it is endowed to a wonderful degree, whence, probably, the origin of its name from the Irish *suil*—an eye.* Let us watch its course as it flies along, upwind. With beak pointed slightly downwards, it looks occasionally to the right or the left, but practically all the time is occupied in scanning the sea beneath. Suddenly it is seen to pause; for one moment it remains fixed in the air, and in another instant—from a height attaining to eighty feet, but more often only fifty—it has made its plunge. The plunge may be direct, or it may be oblique; sometimes a Gannet comes down straight as a plummet into the bosom of the ocean, and its fall is accompanied by a splash. A diagram will express better than words the various angles of descent which Gannets are ordinarily seen to employ, when occupied in fishing. Sometimes a Gannet begins by ascending four or five yards, to gain momentum, which indicates that the fish is several yards below the surface. It is reasonable to conclude that the deeper the fish is down, the higher the altitude from which the plunge must be made. Such at any rate was the opinion of the Belfast fishermen, who were thereby guided as to the depth at which to set their nets.* If a plunge be risked near the shore, it will be a slanting one, but even then a rock is sometimes struck, which is fatal.†

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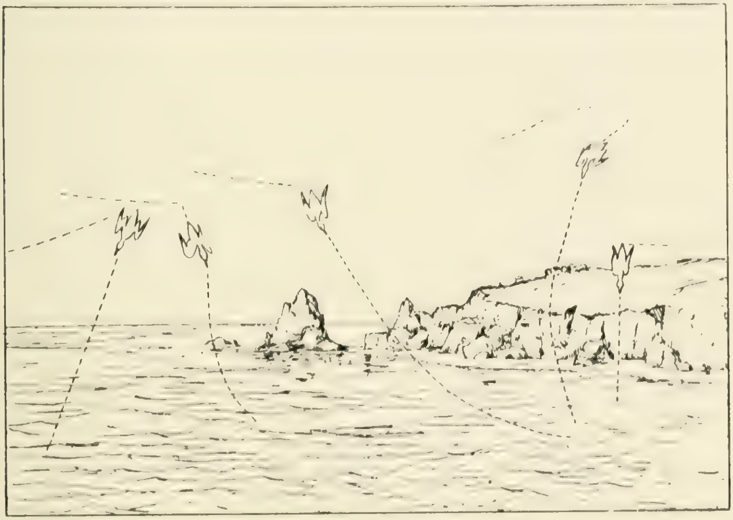
* *See* p. 25.



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* "Natural History of Ireland," III., p. 258.

† According to Olafsen (*see* p. 275).

It is difficult to name the maximum height of a Gannet's plunge, but the most reliable observations were those made by Mr. W. E. Clarke, when spending a month for migration study on Eddystone Lighthouse.* Knowing the level of the lighthouse gallery, he was able to determine approximately the height of many plunges, and in his opinion none, out of many thousand, exceeded one hundred and forty feet. Norman Heathcote thought some reached one hundred and fifty feet.† The average drop, however, would be much less than that. The drop of a Common Tern into the sea is only twenty feet, and is light compared to the Gannet's weighty fall, yet in form they are not unlike; but there is a great difference of structure and an enormous difference in bulk. Nor can the Gannet be compared to the Kingfisher—another plunger with a heavy body, but with no subcutaneous cells to protect it.

The first point in a Gannet's mechanism to be noticed is the setting on of the wings, which are exactly adapted for assuming the perpendicular when in the act of falling in the air, for it will be seen that they are attached nearer to the centre of gravity than in most birds. When a Gannet reverses in the air, it falls of its own weight, and nothing is needed but a motion of the elbow, at the junction of the ulna-bone and the humerus, to regulate the direction of its plunge. Mr. O. G. Pike's camera has caught one just as it was in the act of drawing in its wings, preparatory to dropping, and this snap-shot at the same time shows the use which is made of the tail as a rudder. Until the falling bird is within about three yards of the sea the wings are half-extended, and then, at the moment before cleaving the water, they are drawn in close to the body, which enters the water like a cone. What

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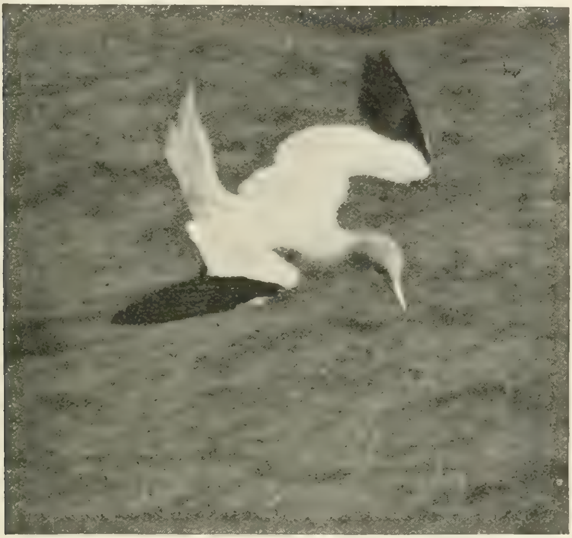
* "Ibis," 1902, p. 264.

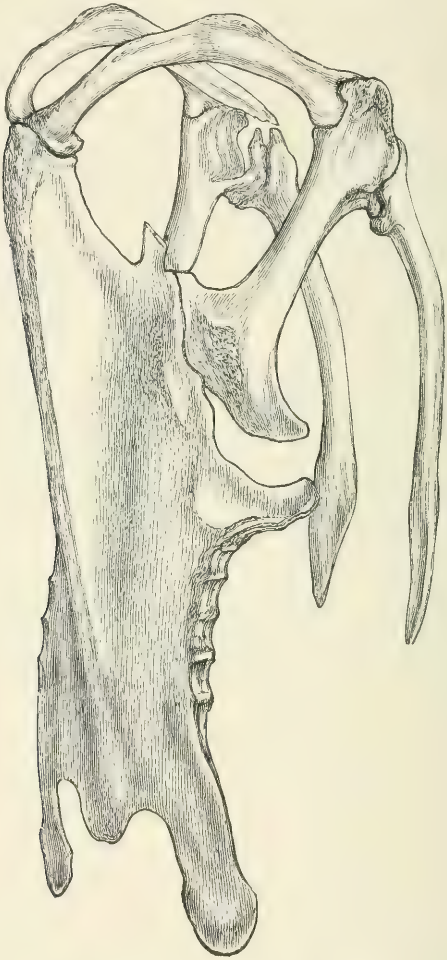
† "St. Kilda," p. 160.



[*O. G. Pike, Phot.*

GANNET ABOUT TO PLUNGE.

eases off the shock, is the net-work of subcutaneous air-cells, to be fully described in Chapter XXII., which



cover the pectoral muscles, and are probably inflated by the mere act of falling through the air. The cut,* taken by permission from Mr. Dresser's work, shows the coracoid bones, two-thirds the natural size, as well as the large projecting wedge on the front part of the sternum, between which and the base of the coracoids there is a strong fibrous muscle. It also shows the powerful clavicle arch, which, unlike that of other birds, is fused into the ridge of the sternum, and which is probably capable of movement with the coracoids. With such a peculiar way of getting its livelihood one expects a very specialized form of skeleton, and accordingly we find it. The strong pointed beak and hard flat skull, the great strength of the fifteen cervical vertebræ, the prolongation of the sternum to afford protection to the abdomen, the absence of nostrils, and the smallness of the ears, are all designed to be of assistance to the Gannet in its plunges.

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* From "The Birds of Europe," by H. E. Dresser (VI., p. 188).

Mark the splash of the concussion, very audible if near and instantly a column of spray is thrown up, sometimes ten feet into the air, according to Mr. Hudson.* I know it is visible to good sight a mile away. Well do the fishermen of Cornwall and Devon realize what that splash means, for a flock of Gannets fishing is an indication where to shoot their pilchard nets. Down goes the Gannet far below—lost to view for the time—a spot of foam alone marking the place where it was last seen. Possibly some fascination has momentarily seized the fish, which one would think might otherwise escape so noisy an enemy. Messrs. G. and A. Thayer have promulgated the theory, that brilliant ruptive patterns, *e.g.*, dark marks on the head and beak, in plunging birds, such as Gannets, Terns, Kingfishers and Ospreys, are placed there to mislead fish*—a very plausible idea, though wanting more confirmation than it has at present. Mr. W. E. Clarke found, during the month spent by him on Eddystone Lighthouse, that Gannets evidently could not catch fish when the sea was perfectly calm,† for they changed their fishing grounds when such was the case, and I was told the same at the Bass Rock.

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* "The Land's End," by W. H. Hudson, p. 76.

As to what goes on below the water it is difficult to speak with any certainty, but Mr. Booth says his tame Gannets when they dived used their wings beneath the surface after the manner of the Guillemot. A Cormorant only half spreads its wings when below, and it is not likely that Gannets fully extend them.‡ Nor is there much more certainty about the depth to which Gannets are capable of diving—but of that, more presently. According to the late Mr. James Tomison, it is easy to form a conclusion as to whether a dive has been successful or not, for if nothing has been caught, the Gannet on emerging takes to flight immediately, whereas when successful a short time is often spent on the surface, and the bird gives itself a shake up before resuming flight.* If this is always a criterion, the percentage of successful dives must be very small. It requires very close watching to discover little *traits* like this in their habits, but everything can be found out in time. Having caught its prey, the Gannet emerges from the sea, with its plumage dry, buoyant as a cork, with emptied air-cells, and head to wind, if there be any, mounts in a wide curve. The fish, which we may be quite sure has been swallowed head foremost, is now in the Gannet's capacious throat, for, unlike the Cormorant, this bird is very rarely seen to bring its prey to the surface. "Only once," says Mr. Tomison, "have I seen the fish in its bill above water, and this was when, instead of diving, it merely skimmed through the surface amongst a shoal of podleys.†" Mr. Tomison has seen Gannets still diving an hour after sunset, and on a still night in August, with a good moon, Lord Lilford has watched them hard at work on the coast of Spain,* but they can hardly go on diving when it is dark.

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* Messrs. Thayer say that these characteristics are not to be met with in stealthy fishers like the Heron and Egret. *See* "Concealing-coloration in The Animal Kingdom" (1909), p. 155.

† "Ibis," 1902, p. 263.

‡ On the habits of diving birds, and their different ways of progression when under water, *see* "Scraps about Birds" (1880), by C. M. Adamson, p. 201, but the author does not draw any comparison of the depths to which different species penetrate. Mr. C. W. Townsend has summed up what is known on the subject in "The Auk" (1904, p. 234). Regarding the diving of the Cormorant, *see* "Birds" (Camb. Nat. Hist.), by A. H. Evans, p. 78, Harting's "Handbook of British Birds," 1901, p. 284, and "Annals of Scottish Natural History," 1905, p. 143, where somewhat opposite opinions find expression. Probably among birds there is no existing diving species so strongly specialized for propulsion through the water as *Hesperornis*.

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* "Ann. Scot. Nat. Hist.," 1907, p. 27.

† Young Coal-fish.

I recall one fine September day when six adult Gannets were plunging, possibly for sand-eels, off North Berwick, about a quarter of a mile from the shore. I found, by the minute-hand of my watch, that they only remained from five to ten seconds under water, sometimes less than that, showing the power this bird has of arresting itself when diving. Their plunges were so continual as to be often at the rate of three drops in five minutes. Perhaps it was near this same spot that John Major had been struck with their industry in the fifteenth century, as he lived near by. "In capiendis piscibus mirabilis est hujus avis industria." In these words the old historian stated a fact which is patent to everyone who watches Gannets and their mode of feeding,—a mode which in Saxon times furnished an appropriate emblem for the sea—ʒanoꞇeꞅ bæð (the Gannet's bath). Few birds work harder for their livelihood, for many of their dives are failures.

There is still one action when they are fishing which calls for notice: now and then the Gannet will almost throw itself on its back in the air, when in the act of descending upon a fish. Quaint old Martin, who did not pass this action by, has the expression: "they descend asquint," *i.e.*, obliquely—not a bad description of what happens. In reality, it is the result of the Gannet's overshooting its mark in its flight and then seeing the fish a little behind it, which necessitates a backward shot.

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* "British Birds," VII., p. 10.

At what age exactly the young Gannet begins to get his living by plunging, I have not ascertained; Mr. W. Evans has seen low plunges as early as September 16th, and on September 26th, 1908, Sir Digby Pigott and I watched young birds on the coast of Norfolk, which we judged not to be more than three months old, hard at work.

Feeding on a Shoal of Fry.—When Gannets meet with what fishermen term a "ball" of fry, or "pan"*—*i.e.*, a compact shoal or crowd of very small fish—they naturally get excited, and, I am told, may be seen swimming round and through the "ball," greedily dipping their beaks among the little fish. I have never had the luck to witness a scene of this kind, but the late Mr. Dunn, of Megavissey, supplied a vivid description of it to Mr. Frank Buckland for "Land and Water."

After mentioning the seething shoals of pilchards and sprats which appear in October off the Cornish coast, migrating eastwards, and the determined attacks which

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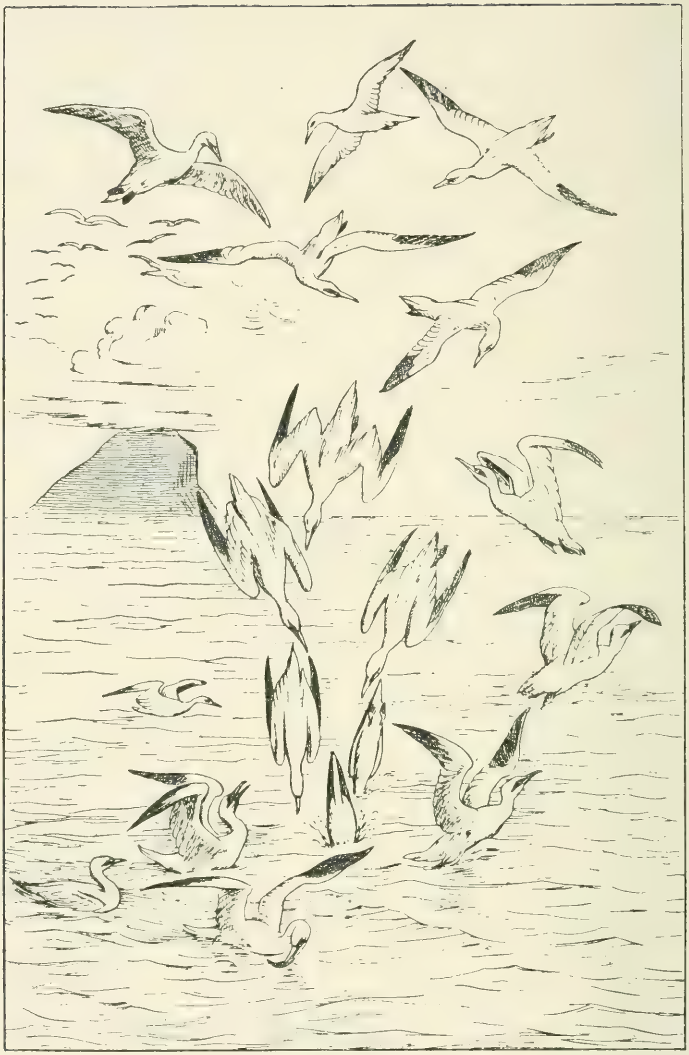
* *See* "Fauna of Shetland Islands" (Article on the Herring).



[From " Birds drawn from Nature."

GANNETS PLUNGING.

Gannets and other birds make upon them from above, as well as large fish from below, he continues :—

"I believe I have more than once seen thousands of Gulls, Terns, Guillemots, Skuas, Razorbills and Gannets mixed up in wild confusion, biting right and left, and feeding on these little innocents; and at the same time such screaming, shrieking and croaking going on by each bird, according to its kind, that I have thought the sounds at ancient Babel must have been music compared to this selfish frenzy. At such times it is interesting to note the Gannets. Such of them as have crammed themselves full may be seen quietly lying on the water outside the mêlée, and those that want more are circling in the air, waiting for a break to be seen among the birds, or for the fish to roll a little on one side of them, and when either happens the Gannet at once gives the warning that he is coming, by issuing loud guttural croaks, and sad is the fate of the band that do not know its meaning."*

A scene such as Mr. Dunn describes may possibly have given rise to Mrs. H. Blackburn's clever sketch of a flock of Gannets attacking a shoal off Ailsa Craig.

Another Cornish naturalist, the late Mr. Jonathan Couch, remarks: "When Pilchards are collected into a narrow space, the number and eagerness of the Gannets are such, that it is surprising they do not fall on and kill each other. Their clamour, indeed, at such times proves them to be well on their guard."*

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* "Land and Water," January 26th, 1877.

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* "A Cornish Fauna," 1833, p. 27.

CHAPTER XVI.

POWERS OF DIVING AND FLIGHT.

The Depths to which Gannets Dive—Swimming—The Gannets' Flight—Gannets at Play—Movements Controlled by Wind—Migration proper.

Depths to which Gannets Dive.—The depths to which our diving sea-birds—Divers, Guillemots, Puffins, Gannets and Cormorants—have the power of penetrating under water, when it is calm and clear, is by no means satisfactorily known. When one of these birds plunges, or makes its dive, the external pressure of the water would expel the air from the body, or at least compress it, and this pressure would increase with each yard of its downward course, until at length its air-sacks would be spent, and great muscular exertion, both by leg and wing, would be required to force its way further downwards. One can hardly imagine that the Gannets' air-cells would give it any advantage over Guillemots, Cormorants and Divers in its descent through the water—rather the contrary—but Gannets have the impetus derived from a high plunge, and the force with which these heavy birds strike the sea must be seen to be credited. Yet in the ascent through the water following the dive, their air-cells would be an advantage, if the Gannet possesses the power of again expanding them ; and possibly that is so, which would account for their sometimes bringing a net to the surface. The agility of Gannets in the sea is very remarkable, considering what unwieldy birds they are on land. A friend of Mr. Laidlaw repeatedly saw a Gannet dive on one side of a net, and come up on the other without getting entangled, indicating their vision under water to be nearly as acute as it is in the air, and also implying great skill in avoiding the net.

The most remarkable story about the diving of Gannets,—and one which has been questioned, although William Thompson regarded it as "fully proven,"—is narrated by that author in Charlesworth's "Magazine of Natural History" (1838, p. 19), and subsequently in "The Natural History of Ireland."* Thompson, having heard from two friends that they had seen great numbers of Gannets which had been taken at extraordinary depths in fishermen's nets near Ballantrae, on the coast of Ayrshire, made particular enquiries from the postmaster of the village, with whom he was already acquainted, and from him learned that "Gannets are very commonly caught about Ballantrae (chiefly in the month of March) in the fishermen's nets, which are generally sunk from nine to twenty, but sometimes to the depth of thirty fathoms [*i.e.*, 180 feet], just as the fish, herrings, &c., are lying. They are taken at all these depths, when the water is rough as well as smooth, and in both the cod and turbot nets (respectively five and seven inches in the mesh)." The same story is also independently told by Gould, who had it when at Ballantrae from some boatmen (" Birds of Great Britain," Vol. V.). On one occasion one hundred and twenty-eight were taken. Thompson's correspondent goes on to say that Red-throated and Great Northern Divers, and Puffins, are also taken in the men's fishing-nets, but does not specify the depth at which they got them. I am informed that the cod season only lasts from January to March or April, at which time Gannets would be returning in numbers to their summer quarters. Ballantrae is some fifteen miles to the south of Ailsa Craig, and off it there lies a large sand-bank, over which the depth of the water varies from one hundred to one hundred and fifty feet, reaching to within five miles of the Craig, where multitudes of herrings and other fish spawn. Further out the water deepens, until it reaches four hundred feet or more.

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* "Birds," III., p. 258.

With a view of ascertaining whether the particulars furnished to Thompson seventy-three years ago were still accepted as facts at Ballantrae, I made enquiries of various persons, and in particular of Mr. William Girvan, who, for many years with his brother netted the sea-fowl on Ailsa Craig, of which he is still the tenant. Mr. Girvan at once said that it was not at all an uncommon thing for Gannets to be caught in nets set at from sixty to seventy-two feet (ten to twelve fathoms)—which is the usual depth for them with the fishermen there—the nets being generally weighted with heavy stones to keep them down.

This, Mr. William Leckie of Ballantrae, an equally good witness, has since by letter corroborated, he having on different occasions seen Gannets, and also Cormorants,* brought up in the fishermen's nets, which nets he could safely say were set at from sixty to ninety feet down, and the birds must have penetrated to that depth to get into them. Mr. Leckie has also seen Guillemots brought up in nets which were set at a depth of a hundred and twenty feet, and of this I have confirmation from the Girvan-town fishermen, through Mr. R. Tannahill, the harbour-master there, who believes that Guillemots have been taken at even greater depths than that.*

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* Mr. T. H. Nelson mentions Cormorants taken on the Yorkshire coast at thirty feet (' Birds of Yorkshire," II., p. 378), and Mr. H. Saunders, Shags which were taken at a hundred and twenty feet, but without saying when or where ("British Birds," IV., p. 153). To Mr. Ticehurst I am indebted for the reference. Colonel Feilden has known Eider Ducks to dive sixty feet ("Geogr. Jour.," 1898, p. 341).

The evidence furnished by Mr. Girvan and Mr. Leckie as to Gannets is further supported by Mr. McCoskindale, of Campbeltown, on the authority of fishermen. These men also relate that when Gannets are brought up alive, they will often eject four or five live fish, which sometimes swim away none the worse for their confinement!

It will be observed that Mr. Leckie gives ninety feet as the greatest depth known to him at which a Gannet has been netted, and a hundred and twenty feet for a Guillemot, but even this latter figure is considerably short of the hundred and eighty feet vouched for by Mr. Thompson's correspondent. Granted that the diving powers of sea-birds are marvellous, yet it is difficult to conceive that a Gannet could force its way against the pressure of water to the depth of a hundred and eighty feet, and most ornithologists will agree with Professor Cunningham in regarding it as an impossibility.†

Swimming of the Gannet.—Not only is the Gannet a great diver, but also it is an exceedingly strong swimmer. Owing to its natural buoyancy, which must be increased by its internal air-cells, it swims high in the water; and unquestionably it can swim fast, as I soon found on trying, quite in vain, to row down an injured one. As it surges through the water, one may judge of the great strength which those webbed feet—used alternately*—put forth, by the wake in the sea left behind, but the whole gait and manner of the bird has too much swing in it to be graceful to my eye. There is one point of difference between the old and the young when they are swimming. An old Gannet always peaks its tail up, high out of the water, but a young one, on the contrary, keeps it in a horizontal position, and quite low.

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* In the "Zoologist" for 1902 we are told (p. 427) of Guillemots being often taken in cod-nets in Loch Striven at a depth of one hundred and eighty feet; that these birds are very great divers is certain, but sixty yards is a long way for them to penetrate below the surface.

† "Ibis," 1866, p. 18.

On land a Gannet progresses slowly, but it is not such a bad walker, as some people imagine who have only seen them when frightened. Then, incommoded by its long wings, the alarmed bird limps along painfully enough, with awkward jumps, which are a vain attempt at flight, but at other times, as Mr. Booth remarks, it can get on nearly as well as a domestic goose.

Flight of the Gannet.—An impression of awe is left on the mind, as one of these great white birds unfolds the vast expanse of its wings, and with the most consummate ease dives into space from the ledge near which you have been standing. Much of impetus there must be in that apparently effortless plunge, or is it merely the weight of its own body (6 lbs.) which is enough to carry the Solan Goose a quarter of a mile in one long stately curve, before it need use its wings again? As a Gannet thus launches forth from the cliff, it will be perceived by anyone who is standing beneath, that the legs are stretched out but that the great webbed feet are folded close. Guillemots and Puffins use their feet a great deal for steering, but I do not remember

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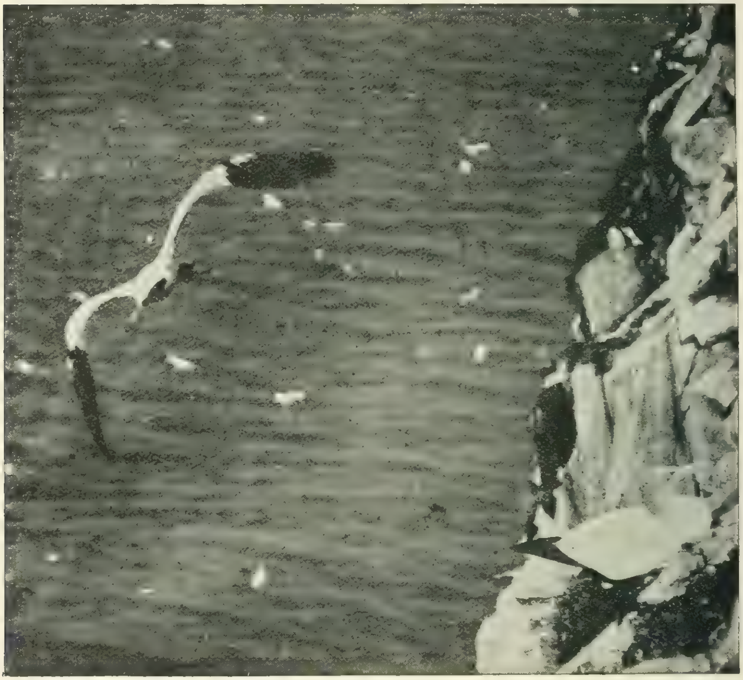
* J. Lea says the Snake-Birds (*Plotus*) adopt an alternate stroke (" Romance of Bird Life," 1909, p. 203).

GANNET FLYING. [*J. C. Adams.*

to have seen a Gannet do so. The flight of the Gannet may be watched to perfection at the Bass Rock, where, with watch in hand, the observer can count its flaps, or marvel at the length of time the great bird can remain nearly motionless in the air. But although whilst thus resting on seemingly motionless wings, a Gannet is doing no mechanical work, it is yet expending strength in order to keep up a certain contraction of the pectoral



GANNET WHEELING IN THE AIR. [*B. Beetham.*

GANNETS ON THE WING. [J. M. Campbell.

muscles.* In rising from the sea, a Gannet takes care to breast the wind, the more easily to disengage its long pinions, which in spite of that flap heavily, and for some distance, upon the water ; while the backward position of its feet also adds to its difficulty in mounting into the air.

Gannets at Play.—One day in August, 1906, when on the top of the Bass Rock, I had my attention drawn to a great company of Gannets—nearly five hundred, I should say—circling round and round in curious evolutions, bringing to mind a swarm of gnats. There was no wind at all, and there was no other conclusion than that they were at play. We know that many birds play, and there is no reason why Gannets should not do so like others of the feathered tribe. This, however, was not the occasion on which Mr. Campbell's photograph was taken.

Movements of Gannets and other Birds controlled by Wind.—There are few subjects which have attracted more attention than the migration of birds, or about which abler treatises have been penned, yet no one thinks that we have got to the bottom of the matter yet. Careful as are the records which have been made by many hundreds of observers, yet there is one important item which has been too often lost sight of—the force and direction of the wind. To those who live on the East Coast of England, and still more to those who reside close to the sea, it must be manifest that the movements of birds are enormously influenced by wind, especially in the autumn, but perhaps less so in the spring.

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* Without which it would fall, *see* article by Professor Roy in "Dictionary of Birds," p. 270.

All large movements may, in a general sense, be spoken of as migratory movements, but, in fact, birds' movements are divisible into two kinds, viz., those resulting from and dependent upon wind, and those which have no other prompting than the desire—which is inherent in nearly all birds—to seek a warmer climate on the approach of winter, and a colder one on the approach of summer. This proposition is not invalidated by the fact that these two causes not infrequently operate simultaneously.

Observations taken in Scotland.—Premising this much about the effect of wind upon birds, I will now select from such Gannet data as are available, a few cases which are attributable, in my view, to this cause. For Scotland I cannot do better than quote from the "Reports on the Migration of Birds," where there are many valuable statistics* collected by Scottish lighthouse-keepers for

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* *See* "Reports on The Migration of Birds" for 1879, 1880, 1881, 1886, in which all the returns for Scotland were tabulated by Mr. Harvie-Brown, who writes: "At Butt of Lewis, the passages of Gannets are noted from the east (when the Stornoway herring season is in full swing), and then also strings and wedges of Gannets fly from N. to S. and are seen approaching the Butt . . . to meet the first herring shoals."—H.B. *in litt.*

Mr. J. A. Harvie-Brown, who, for a great number of years, has done so much for Scottish ornithology.

1. Mr. Harvie-Brown furnishes us with the reckoning kept by Mr. M'Gill of Gannets which passed Cape Wrath, a well-known promontory in the north of Scotland, which all Gannets going to the Minch, or returning north from it, must go round.* After a general statement that the number of Solan Geese which pass Cape Wrath is frequently beyond anyone's power to reckon, Mr. M'Gill, the lighthouse-keeper, gives the following count of Gannets for fifteen—not quite consecutive—days, commencing July 14th, 1879 :—

July	14,	1879,	600 to 700	Gannets.	Wind	E.	
,,	15,	,,	200	,,	,,	E.	haze.
,,	16,	,,	40 to 90	,,	,,	E.	,,
,,	22,	,,	200 to 400	,,	,,	N.E.	fog.
,,	24,	,,	100 to 200	,,	,,	S.W.	
,,	26,	,,	300 to 400	,,	,,	S.W.	haze.
,,	28,	,,	90 to 100	,,	,,	S.W.	,,
,,	31,	,,	60 to 80	,,	,,	S.	,,
August	1,	,,	100 to 300	,,	,,	W.	,,
,,	3,	,,	300 to 400	,,	,,	E.	,,
,,	4,	,,	60 to 70	,,	,,	E.	fog.
,,	5,	,,	20 to 30	,,	,,	N.E.	,,
,,	7,	,,	40 to 50	,,	,,	N.	,,
,,	8,	,,	20 to 40	,,	,,	N.	,,
,,	9,	,,	20	,,	,,	N.	haze

2. In 1880 the record was again remarkable at the same place, from 800 to 900 Gannets being seen by Mr. M'Gill to pass Cape Wrath on a single day—April 14th. They were going east, and against the wind,† the strength of which is not stated.

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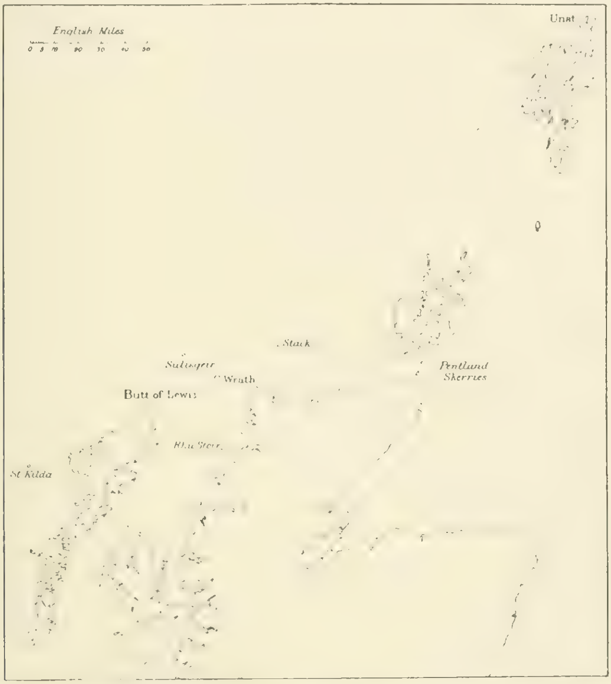
* "Zoologist," 1880, p. 200.

† "Report," 1880, p. 90.

3. On August 19th, 1881, about 2,300 Gannets, mostly flying east, were roughly counted between daylight and dark by another of Mr. Harvie-Brown's correspondents, as they flew past Pentland Skerries, which lie between the Orkney Islands and Caithness.* I have ascertained that the wind on that day was registered in the north of Scotland as E.N.E., force 2.


English Miles
0 5 10 20 30 40 50
Unst
Stack
Sulisgeir
C. Wrath
Butt of Lewis
Rhu Stoir
St Kilda
Pentland Skerries

4. Again, on the 3rd, 4th and 5th August, 1881, Gannets in thousands passed Rhu Stoir on the west coast of Suther-

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* "Report," 1881, p. 11.

landshire, flying north.* On these three days there was a violent gale (force 6–8) in the north of Scotland which, according to the Meteorological Office, commenced in the S.W. and veered to the N.W., against which these Gannets were presumably making head.

5. Other statistics of extensive Gannet movements collected for Mr. Harvie-Brown are to be found in the "Migration Reports"—*see* particularly those for 1881 (p. 11), 1882 (p. 61), 1883 (pp. 23, 72), 1884 (pp. 31, 88), 1885 (pp. 30, 105), 1886 (pp. 20, 74).

Observations taken in Ireland.—For Ireland Mr. R. M. Barrington has collected many valuable data of the movements of Gannets, which are given in detail, but without stating the direction of the wind, in "The Migration of Birds as Observed at Irish Lighthouses" (1900), pp. 249, 252—as well as in the second part of this work, entitled "Reports on the Migration of Birds" (pp. 53, 119, 191, 259, 326, 378, 444, 492, 535, 613). Mr. Barrington is of opinion that there is a spring migration of Gannets northwards up the east and west coasts of Ireland, and at the same time westwards along the south and north coasts (p. 250). Not only has he recorded numerous autumnal observations, but also many which were made in December and January, and these most likely have no reference to Irish-bred Gannets, but to such as have come from the more northern stations in Iceland and the Færöes.

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* "Report," 1881, p. 50.

Migration Proper as Distinguished from Wind Movements. —As already suggested, it is more convenient to treat what—so far as Europe is concerned—may be called migration proper, as something quite distinct from movements which are mainy due to wind. Gannets' movements, when wind is blowing, are just the same as those of Gulls on the coast of Norfolk :[*] the Gulls cannot remain stationary—they must either go against the wind, or allow themselves to be carried away by it. It is the same with the Gannets. Gannets are not typical migratory birds. The mode in which the want of sustenance produces migration in this species, may be illustrated by adapting the words of the late Professor Newton to it. As fish, which is their only food, grow scarce on the approach of winter in the most northerly limits of their range, the individual Gannets affected thereby seek it elsewhere. Thus doing, they press upon the haunt of other individuals ; these, in like manner, upon that of others ; and so on, until the movement which began on the shores of Iceland, is communicated to Gannets occupying what had been their outward ocean-range at that season ; though, but for such an intrusion, these last might have been content to stay some time longer in the enjoyment of their existing quarters.* It may be safely asserted that Gannets are but slightly affected by extreme cold, provided only their supply of food is not curtailed thereby.

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[*] An Article in "The Ornithologist," edited by H. Kirke Swann (1897 pp. 21-46), is on this subject.

Now Gannets are not at all typical migratory birds—taking the word in this restricted sense, few frequenters of the ocean are. Neither are the Guillemot, Razorbill and Puffin—which return to their breeding haunts with regularity, but do not all return from a more southern latitude—to be called typical migrants. They go where there are fish, often keeping far out to sea in the winter, but evidence indicates that a portion of them do not go south. The Divers (*Colymbi*)† do, it is true, make a considerable movement with the seasons, but all records point to there being little change of area with the Cormorants, and not a great deal among Gulls.

Gannets on British Coasts in Winter.—Gannets are not all migrants, because they have been repeatedly met with in December and January‡ on many points of the

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* "Dictionary of Birds"—Art: "Migration."

† Gätko records "inconceivable" numbers of *Colymbus septentrionalis* off Heligoland on the 2nd and 3rd December, 1879, "almost by the million" ("Zoologist," 1880, p. 184) ("Birds of Heligoland," p. 576).

‡ Mr. Campbell communicated to the "Scotsman" the following entries of Gannets seen at the Bass Rock in the mild winter of 1910-11:—December 1st, about 300; 16th, (?) twenty; 31st, twenty-seven; January 10th, 1911, six; 12th, fifty; 13th, about a hundred; 21st, about five hundred, of which some settled on the Rock.

British coast—when the weather was mild and there were fish enough to their liking—and in Ireland, as pointed out by Mr. Barrington; also many times in Shetland. Referring to the Færöes, Müller says: "Single birds may be seen flying throughout the whole winter;" * and even on the coast of Iceland they are not absent in winter.

On the other hand, they have been encountered at times very far to the south in summer—Mr. C. B. Ticehurst met with them off Lisbon as late as May 28th, and many were seen one August by Lord Lilford off the north-west coast of Spain.†

Of course, their immense powers of flight have to be remembered; from the north of Spain to the south of Scotland is only a thousand miles, a distance a Gannet would accomplish in five days, or much less with a very favourable wind.‡

How far each settlement, as summer comes round, retains the same Gannets which by right belong to it, is another matter. Such few experiments in ringing sea-birds as have

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* *See* p. 266.

† Lilford's "British Birds," VII., p. 10.

‡ We hardly realise what are the possibilities of a bird's flight with the wind behind it. *Diomedea exulans* (L.) has been known to cover 3,400 miles in twelve days ("The Auk," 1895, p. 291), but that might easily be exceeded.

been made at present, have hardly proved or disproved the accepted theory of their returning year after year to the same rocks.* That we may anticipate some extension of the Gannets' range is probable, for increase in the numbers of a species, must induce its surplus members to go further afield.

The Migrations of Canadian Gannets.—The status of Gannets in Canada and the United States has already been touched upon, and there are no special features to remark on in their migrations. Doubtless wind affects them as much as it does on the east side of the Atlantic. Having but a limited acquaintance with the natural history of North America, I have again applied to Mr. F. M. Chapman, who has supplied me with a few data. On March 1st, 1904, Mr. Chapman found Gannets abundant in Norfolk Harbour, Virginia, as well as off the coast. On April 19th, 1902, he had met with ten Gannets, which may have been going north, in about latitude 36,° on the coast of North Carolina. On the authority of Mr. Wayne, Mr. Chapman adds that the Gannet occurs regularly along the coast of South Carolina during both spring and autumn,

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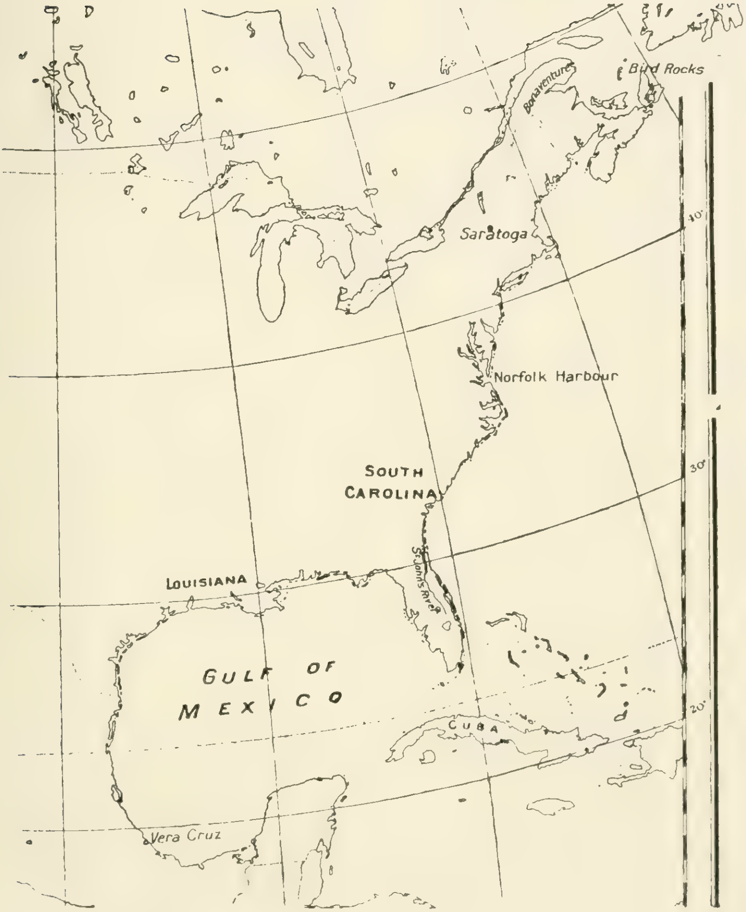
* In 1904 Mr. J. Laidlaw, at that time principal of the Bass Rock lighthouse, fixed a metal ring on the legs of fifty-two adult and forty young Gannets, but as only two of them were heard of again, and that not long afterwards, it is to be feared that they got the rings off ("Ann. Scot. Nat. Hist.," 1904, p. 245).


Bird Rocks
Bonaventure
Saratoga
Norfolk Harbour
SOUTH CAROLINA
St. John's River
LOUISIANA
GULF OF MEXICO
CUBA
Vera Cruz
40°
30°
20°

but not in winter; and further, that it winters off the mouth of the St. John River, Florida, in considerable numbers.* A good many undoubtedly do not stop short of the Gulf of Mexico, where Gannets are not uncommon in winter, especially on the coast of Louisiana ("The Auk," 1907, p. 316) as well as off Vera Cruz (Beebe's "Bird-Lovers in Mexico," p. 381). One only is recorded from Cuba.†

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* *See* "Contributions from The Charleston, S.C., Museum," No. 1, 1910, p. 10.

† "Naumania," II., Part 2, 1852-54. Professor W. Cooke has contributed, through Mr. Chapman, three records of Gannets which have been picked up inland, additional to those already given (page 33)—viz., one, November 11th, 1880, Saratoga Lake, N.Y. (Merriam "Orn. and Ool.," 1882, p. 96); one, December 10th, 1879, Canton, N.Y. (Lee, "Bull. Nutt. Orn. Club," 1880 p. 190); one, Wainfleet, Ontario (Fleming, "The Auk," 1908, p. 486).

CHAPTER XVII.

MORTALITY AMONG GANNETS, AND LIABILITY TO ACCIDENTS.

The Liability of all Birds to Accidents—Causes of Death in Gannets—Is the Gannet an Increasing or a Stationary Species ?—The Many Accidents to which Gannets are Liable—Whilst in Lethargy—When Descending upon Prey—In continuous Rough Weather—In Foggy Weather.

The Liability of all Birds to Accidents.—The mortality which goes on among birds must needs be very great—far greater in truth than many people, who have not given much thought to the question, realize. Birds have no provident habits : they do not lay up stores of food for use during times of scarcity, as some quadrupeds do*—on the contrary, they are eminently wasteful of food when they have it.† Probably almost as many birds perish annually as are born. It is not too much to estimate that millions must be destroyed, by violent deaths of one kind and another. There are all the victims of the sportsman's gun to be considered, as well as those killed by birds-of-prey, by rats, cats,* and other vermin; while we in England know only too well what a heavy toll protracted frost and deep snow take of bird-life. Telegraph wires and the lighthouse, decoys and nets, are also answerable for many lives. We can guess at, but we can never know, what vast numbers of the smaller denizens of our groves perish when crossing the seas, during those two great annual journeys which nineteen-twentieths of them must perforce perform—that to the south in autumn, and that to the north in spring.

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* Some Woodpeckers, however, are said to store food, and Shrikes return to prey which they have impaled.

† Redwings, for instance, will divest a holly-tree of far more berries than they mean to eat, and these falling on the ground soon become hard and useless.

But it is among nestlings that the greatest waste of life takes place. In Tern settlements the death-rate among nestlings is very high,† as it is sometimes known to be among closely-packed communities of the Black-headed Gull,‡ as well as among Albatroses.§

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* A well-known American naturalist estimated that 1,500,000 small birds were destroyed in a single year by homeless and abandoned cats in the New England States, U.S. ("Year Book Dept. Agriculture," 1908, p. 189). Mr. W. L. Finley also remarks on sick birds being captured by cats ("The Condor," 1909, p. 181).

† See "Reports of The Farne Islands Association," 1897, 1906, 1907, 1911, and Alcock's "Naturalist in Indian Seas," 1902, p. 182.

‡ "British Birds" (Mag.), 1909-10, p. 170.

§ W. Eagle Clarke "Ibis," 1905, p. 264.

There are tracts in England in which in a very wet season almost the entire hatch of young Partridges is carried off, and wild Pheasants die in large numbers. In the case of the antarctic Penguins, there is an enormous mortality amongst them whilst still young, as the researches of Mr. E. A. Wilson, of the ship *Discovery*, have abundantly proved.*

So far as we can judge, death from old age is by no means the usual termination of a wild-bird's life. Reflection leads us to the rather startling conclusion, that nine birds out of ten meet their deaths by accidents or by starvation.

As to what becomes of dead birds, that is a problem : those which die at sea sink into the sea, but what of those which die on land ? This is a mystery which has never received a satisfactory solution. They vanish, and that is all that can be said.†

Mortality among Gannets.—With regard to the Gannet, it cannot be disputed that great numbers of young ones are annually reared, and get safely to sea, yet three-quarters of them must assuredly die in a few months time, otherwise new colonies would be formed, or the existing ones be largely augmented. In twenty years one pair of Gannets would multiply into three hundred and ninety-eight birds, if they began to breed at the age of three, and all bred every season. What becomes of them ? It seems almost impossible that so many die for lack of food, yet be it remembered food is the primary condition which determines the existence of all wild animals. Now that so few are killed at St. Kilda, where they are no longer eaten, and where bird-oil and birds' feathers have ceased to have much value, the young Gannets which annually take the water at that place alone probably number nearly ten thousand.* But it is not only at St. Kilda that no young ones have been killed for years ; practically none have been taken at Ailsa Craig, the Bass Rock, the Irish stations, or at Grassholm, and from these places probably five thousand more young Gannets put to sea every year. What, then, becomes of all these fifteen thousand young Gannets ? Here is a problem, none too easy of solution. No doubt some go to augment the breeding-stock at existing stations, notably at the Skelligs, where the increase is very gratifying ; but still, this does not account for a quarter of them. The only explanation which offers itself to naturalists, is that there must be a large annual mortality. One proof that this is so is the scarcity of the young Gannets, comparatively speaking, between Christmas and May, although there are generally plenty of old ones to be seen at sea at that time, either on British coasts or further south. Among ornithologists who have alluded to this scarcity are Hügel,* Gatcombe,† Pidsley,‡ Ticehurst,§ Cordeaux,** and Benoist.†† One of the very few notifications of young Gannets in any abundance after September that I have come across, occurs in one of the lighthouse-keeper's reports transmitted to Mr. Barrington.§§

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* Zool. "National Antarctic Expedition," 1901-4, Vol. II. : Aves, p. 10.

† The whole subject is well treated by Mr. Dewar in "The Indian Field" (Dec. 22nd, 1904), in an Article entitled "How Animals Die."

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* The Rev. Neil Mackenzie, formerly Minister at St. Kilda, estimated the average annual hatch of Fulmar Petrels at St. Kilda to be 20,000, the take being about 12,000 (" Ann. Scot. Nat. Hist.," 1905, p. 78). Ten thousand young Gannets would therefore be reckoning the Gannet population as equalling half that of the Fulmars.

The explanation of these young ones' absence is not, as some might at first think, that they have already moulted the black plumage, for, as a matter of fact, this black garb is not shed until the Gannet is nearly a year old. In proof of this a young Gannet in confinement showed no change of plumage at nine months, and not much at ten.[*]

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* "Zoologist," 1874, p. 3906.

† "Zool.," 1878, p. 53 ; 1887, p. 377.

‡ "Birds of Devonshire," p. 85.

§ "Birds of Kent," p. 303.

** "Birds of the Humber," p. 191.

†† "Memoir de la Soc. imp. des Scienc. natur. de Cherbourg," 1854.

§§ Report from Tearaght lighthouse on the south-west of Ireland. ("The Migration of Birds as Observed at Irish Lighthouses," by R. M. Barrington, p. 251, and "Report," 1884, p. 180) ; but then, this was no later than October 13th.

Comparatively scarce also, as was pointed out by Thompson,[†] and also by D'Urban and Mathew,[‡] are the piebald, *i.e.* second-year Gannets; yet all Gannets, before reaching maturity, have to pass through this intermediate piebald stage, which lasts from the age of twelve to about twenty months.

That a great many young Gannets do die somewhere is an indubitable fact, although their bodies are never seen, and, consequently, of actual proof there is none. But they do die, and we cannot be far wrong in surmising that their short existence terminates in the period between September 1st and December 31st. It can only be at sea that this takes place, and it is easy to understand how quickly their dead bodies would be lost to view.

Sluggishness of the Gannet.—In connection with this mortality, though not explanatory of it, it should be pointed out that the Gannet is an eminently sluggish bird, a quality arising from its being either naturally sleepy or very deaf. There is an inherent sluggishness in all the species of the genus *Sula*—whereby some of them have earned the name of Booby (Portuguese *bobo* = a fool)—and hence, through their own inertness, they are often exposed to danger. Of this inertness it would be easy to quote many examples, but one will suffice, which occurred at sea:—"July 19th, 1904 We found an adult Gannet asleep on the water, which was calm, which we tried to catch with a landing-net, but when the boat (a good-sized sailing craft) was within a few yards, it awoke and flew away" (J.H.G. Journal). Wherever there are Gannets, fishermen are familiar with incidents such as this, yet they can never give a satisfactory explanation of these sleepy Gannets Some, like John MacGillivray, and H. C. Müller the Færöese naturalist, think that it arises from overfeeding, but a hearty meal had no such soporific effect on my tame Gannets. Perhaps what we take for sluggishness may be only the result of deafness, for the orifice of a Gannet's ear is very small, covered with feathers, and reducible to the size of a pin's head by muscular contraction.* Whatever be the cause of this sluggishness, it is not without danger to the Gannet—in fact, it proved a fatal quality in the days when, being in demand for food, the fowler stole upon them unawares. His first effort was to catch the sentinel, and, this accomplished, the remainder of the party of Gannets were surprised and captured before they had time to awake.

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[*] Three young ones received in the down from Grassholm Island by the Zoological Society, on June 27th, 1908, had, on June 21st, 1909—being then, as I supposed, twelve-and-a-half months old—black backs with a few light spots still remaining, partly white heads, and nearly white breasts.

[†] "Birds of Ireland," III., p. 257. Mr. C. B. Ticehurst tells me he observed Gannets in this stage off Lisbon, on April 17th and May 28th, and off the Bay of Tunis on April 23rd, 1909.

[‡] "Birds of Devon," p. 178.

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* As I have observed when holding a live one; the Cormorant's is not much larger.

Is the Gannet Increasing?—In spite of the mortality which goes on among the young Gannets, and in spite of all the accidents, to be mentioned immediately, to which this species is subject, there can be no doubt that it is on the increase. When on the coast of Kerry in 1908, I heard the most encouraging accounts from the fishermen of the prosperity of the Gannets on the Little Skellig, which a recent letter from Mr. Byrns, the principal of the lighthouse, dated August 11th, 1911, confirms. The same satisfactory report, although in a less degree, was given at Ailsa Craig in 1905. It is difficult to form any correct opinion about the great settlement at St. Kilda, but Mr. W. Evans discerns an increase at the Bass Rock. At Grimsey also ten pairs have multiplied into fifty, according to Mr. B. Hantzsch.* A recent writer lays it down as an axiom that the numerical level of a species is largely dependent upon the supply of food which it finds to hand.* If this be so, and if the Gannet be an increasing species, it follows that the fish which form its food are increasing also. Here is a legitimate argument in favour of the preservation of the Gannet, and an answer to those who recommended the repeal of the Sea-Birds' Preservation Act in Scotland in 1878.

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* "Vogelwelt Islands" (1904).

The Accidents to which Gannets are Liable.—Some species of birds are more singled out for misadventure than others, and I really think this can be said of the Gannet. We may get some faint idea of the multiplicity of accidents which befall bird-life, by briefly reviewing those to which Gannets are liable ; nor would a natural history of this bird be complete without alluding to them.

Choked by Gurnards.—Probably, when descending on its prey, the Gannet closes the nictitating membrane of the eyes, and, with this curtain to its orbit, it would not always distinguish one fish from another. Accordingly it sometimes drops on something unsuitable, such as a gurnard (*Trigla gurnardus* or *T. hirundo*), whose spinous dorsal fin may easily become wedged in the Gannet's throat. The well-known Scotch naturalist, Mr. R. Gray, writes : "At various times I have discovered dead birds [*i.e.* Gannets] at the base of the cliffs there [Ailsa Craig], with gurnards firmly wedged in their throats, and have been obliged to use a knife for cutting the spines before the fish could be taken out. Individuals have also been picked up on the water similarly situated."* But gurnards are not the only fish which may prove a cause of death to the Gannet. There used to be in the museum at York (but I could not find it when last there) the skull of a Gannet which had been killed by the hard snout of a garfish, the sharp upper mandible of which, passing obliquely through the eye, had entered the brain.†

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* Pycraft's "History of Birds," p. 14.

Plunging into Boats.—Two or three writers, whose veracity is beyond question, relate anecdotes of Gannets which have precipitated themselves into boats, wherein they detected the shining scales of freshly-caught herrings. I can quite credit these stories, marvellous as they may at first sight seem to be. John MacGillivray‡ tells of a Gannet which actually passed half through the bottom of a boat, and remained there. But even more extraordinary than their plunging into boats is the anecdote which William Borlase —a naturalist of one hundred and forty years years ago— tells of a Gannet which, for some reason, quitted the sea to fly over Penzance, and espying some pilchards spread out on a board in a fish-curing cellar, darted down upon them, and with such force that its beak went through the plank on which the fish were.* A similar incident happened in Whitby—a Gannet descending on some herrings spread out in a cellar, where it was soon captured alive—of which I was told when there in 1906.

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* "Birds of the West of Scotland," p. 462. Cormorants occasionally share the same fate ("Field," September 24th, 1910.)

† No doubt the same one mentioned in Morris's "British Birds" (VI., p. 80); it had flown inland as far as Swainby, and was found about twenty miles from the coast.

‡ "Edinburgh New Phil. Journal," 1842, p. 66. See also "Travels in the Western Hebrides," by Lane Buchanan (1798), p. 125. While giving credit to John MacGillivray's informants, I am afraid that Roderic O'Flaherty's assertion that the Gannet "flys through the ships sailes, piercing them with his beak," will hardly pass current ("West or H—Iar Connaught," 1684, p. 12).

Meshed in Nets.—Gannets are not infrequently meshed in nets, of which some account has been already given (see pp. 107, 408). William Thompson, an eminent Irish naturalist, has given currency to a circumstantial anecdote about a train of fish-nets having proved the death of no less than one hundred and twenty-eight Gannets, near Ailsa Craig. The story, which may be exaggerated, rests on the good faith of one John Coulter, a fisherman, who removed the Gannets from the nets, and who informed the postmaster of Ballantrae that "he took ninety-four gannets from one net, at a single haul, a few years ago. The net was about sixty fathoms long†—a cod-net wrought in a 5-inch scale. The birds brought up the net, with its sinkers and fish, to the top, where such as were not drowned, made a sad struggle to escape. There were four nets in this train; but the above ninety-four were in one of the nets, and there were thirty-four additional birds in the other part of the train, being one hundred and twenty-eight gannets in all."*

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* "Journal of The Royal Institution of Cornwall," 1864, Sup., pp. 44.

† 360 feet.

Sometimes taken with Hooks.—Sometimes Gannets get themselves entrapped by heedlessly swallowing fish which have been hooked. This is not an uncommon circumstance when Kerry fishermen are pulling their ling and cod lines off the Skelligs, and other birds are sometimes hooked also. Martin has a reference to fish-hooks being found in the stomachs of Gannets which had swallowed and flown away with them†; but lines are not so easily broken nowadays, and great force would have to be exerted by a hooked Gannet to tear itself away. Mr. W. E. Clarke informs me that when he was at St. Kilda in September, 1910, a steamer came in with seven Gannets on board, and he ascertained that they had all been caught by swallowing fish intended as baits for larger fish.

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* Charlesworth's "Magazine of Natural History," 1838, p. 19. The story is also told by Robert Gray in the "Intellectual Observer," 1864, p. 119, and by J. Gould ("Birds of Great Britain," V.).

† "A Voyage to St. Kilda," p. 51.

But they are not always to be thus captured, for on one occasion a friend of Mr. John Laidlaw saw a Gannet pick a haddock in clear water off the line with which he was fishing in thirty-six feet of water, and rise to the surface without getting caught itself.

Unable to Rise from a Calm Sea.—Gannets have much difficulty in rising from a perfectly calm sea, and this is owing to the length of their wings, which springing from near the centre of the body, impede rather than assist them. Albatroses experience the same disability for the same reason. Mr. O. G. Pike on one occasion fell in with a notable instance of this incapacity of flight.* Happening to be in the vicinity of the Bass Rock, he came across an immense quantity of Gannets floating on the sea, in a dead calm. So perfectly helpless were they, that they could not fly, or make any use of their wings whatever ; and in spite of many futile attempts to rise from the water, only a very small portion of them eventually succeeded in so doing. Another mischance of a peculiar nature, but attributable to the same cause, befell some Gannets at Sennen Cove in Cornwall, on November 23rd, 1894, which I here relate in the words of Mr. W. J. Welch who was present : " A very heavy sea was running, with no wind to speak of, from E.S.E. For some days there had been many hundreds of Gannets fishing in the bay, and on this afternoon, owing to there being no wind, the breakers rolled them on to the shore by hundreds, some dead but a great many alive. Whitesand Bay was soon a scene of animation, as the fishermen caught a great many ; one man getting a cartload. Most of them were adult birds." Nobody at The Land's End remembered such a thing happening before,* nor has it, says Mr. Welch, writing to me in 1911, happened since, to his knowledge. Mr. Welch attributes the disaster to there having been a gale which dropped to no wind at all, but left a tremendous sea running.

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* "Country Life," May 18th, 1897.

Starved by Rough Weather.—Guillemots and Razorbills, and Gannets too sometimes, are reduced to starvation by continuous rough weather, which naturally has the effect of driving the fish (their only means of subsistence) into deep water, or else it so discolours the sea that they can not discern them. Every British ornithologist who has walked his native shores, must have occasionally come across the carcass of a Gannet at or above high-tide mark, the reason of whose demise was attributable to these causes. We may guess, with some measure of certainty, that it was to a like starvation, consequent on rough weather, that a great mortality on the French side of the English

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* "Field," 1894, p. 931 ; and "The Land's End," by W. H. Hudson (1908), p. 86.

Channel in February, 1824, was due. Particulars of this disaster have been handed down by M. Baillon, an accurate French ornithologist, who saw the dead birds lying spread along the shore, and testifies to there having been about two hundred Gannets, with some five hundred Razorbills, Gulls, etc., on an extent of four miles, near the mouth of the Somme.[*]

This was in February, and it is generally in the winter that sea-birds are washed up in this way, but Professor Macgillivray alludes to a mortality among Gannets in the Hebrides in summer, which is much more unusual.[†][‡]

Supposed Victims to Disease.—Every living organism is liable to disease, but in the Gannet it has never been medically certified, except in so far as emaciation resulting from starvation can be called disease, a condition of things very favourable to the development of entozoa.* Nevertheless, Faber, who generally spoke from personal observation, asserts that in Iceland, Gannets were "sometimes attacked by an infectious disease which destroys countless numbers which drift, dead, on to the shore."†

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[*] I quote from Degland's " Ornithologie Européenne (II., p. 348) ; the incident is not mentioned in Baillon's " Catalogue des mammifères oiseaux, etc., d'Abbeville," 1833. On this same coast Puffins also sometimes perish by thousands. Baillon le père écrivait de Montrèuil-sur-Mer, le 16 avril, 1781, " Le vent du nord nous a envoyé cet hiver des milliers de Macareux morts et noyés dans la mer " ("Rev. Fr. d'orn.," 1911, p. 123).

Probably in Harris, where his youth was spent (MacGillivray's "British Birds," V., p. 414).

[‡] Mr. L. E. Taylor relates that on June 17th, 1906, he found the beach at Muizenberg, Cape Colony, lined with thousands of heads and wings of the South African Gannet, *Sula capensis* (L) ("Journal South Afr. Orn. Union," 1909, p. 84) : most likely the effect of rough weather, after which shore-crabs and sand-hoppers may have disposed of their bodies as they lay on the shore.

Gannets are often Picked up Inland.—It is well known to naturalists that sea-birds are often picked up inland, generally alive when found, but always reduced to a helpless condition. These mischances most often befall in autumn, and the victims are Little Auks, Storm-Petrels, Gannets, Guillemots or Puffins, more seldom Cormorants, Shearwaters and Divers, but never Gulls.‡ A common idea is that all such stray birds have been blown inland, but if one marks how Gannets and Guillemots can play with the wind, as if their proper sphere was a gale, it is more probable that in most instances they have lost their way in a fog. Be this as it may, Gannets and other sea-birds often, but quite involuntarily, we may be sure, make their way inland. It may be doubted if there is a single county in England or Scotland, inland or maritime, in which Gannets have not been picked up at one time or another. In Scotland it has not infrequently happened that some peasant returning to his work, has been astonished at finding a Gannet in one of his fields, and they have been discovered oftener than once in the most inland parts of Yorkshire* and Northumberland. For Nottingham Mr. Whitaker records nine, for Surrey Mr. Bucknill seven, for Shropshire Mr. Forrest six, for Leicestershire Mr. Montagu Browne five, for Northamptonshire Lord Lilford three, for Berkshire Mr. Clark-Kennedy two. In the maritime counties they occur inland still more frequently, as might be expected.

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* *See* Report by Mr. D. Robertson, on A Great Mortality of Sea-fowl in 1859 ("Proc. Nat. Hist. Soc.," Glasgow, 1858-69, pp. 2, 4).

† "Prodromus der Islandischen ornith.," 1823 (translation).

‡ Colonel Feilden, however, has found Gulls alive, but unable to fly after a severe tempest.

I have been at some pains to make a list of Gannets found inland, in Norfolk, Suffolk and Essex, three counties bordering on the sea, where records have been kept, and on looking through the dates I find one put down for January, none for February, March or April, two for June, one for July, no less than nine in September, six in October, two in November, and four in December.

The subject of Gannets inland attracted attention long ago, and accordingly British records go back a considerable way. Sir Thomas Browne, the famous Norfolk physician, who lived in the reign of Charles II., cites two instances of the kind, one of them relating to a Gannet caught by a greyhound near Swaffham. Two hundred years later and history repeats itself—the late Mr. Southwell recording a Gannet attacked by a dog but killed with a stick, near the very place mentioned by Sir Thomas Browne.* Nehemiah Grew (1669) cites another of these poor waifs "by some means fall'n on the ground," and John Morton a third.† Grew is referring to the same Gannet which Ray and Willughby had already described as having been found in November, 1669, alive near Coleshill in Warwickshire.

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* Nelson's "Birds of Yorkshire," II., p. 283.

Having once alighted on the ground Gannets feel themselves too incapacitated by their long wings ever to attempt to rise again, and are therefore caught or killed by the first passer-by, whence originated the idea to which some early writers give expression, that they could not fly over land.

But it is not only in Great Britain that Gannets have been picked up inland; their presence very far from the sea has been certified in Holland, Belgium, Norway,

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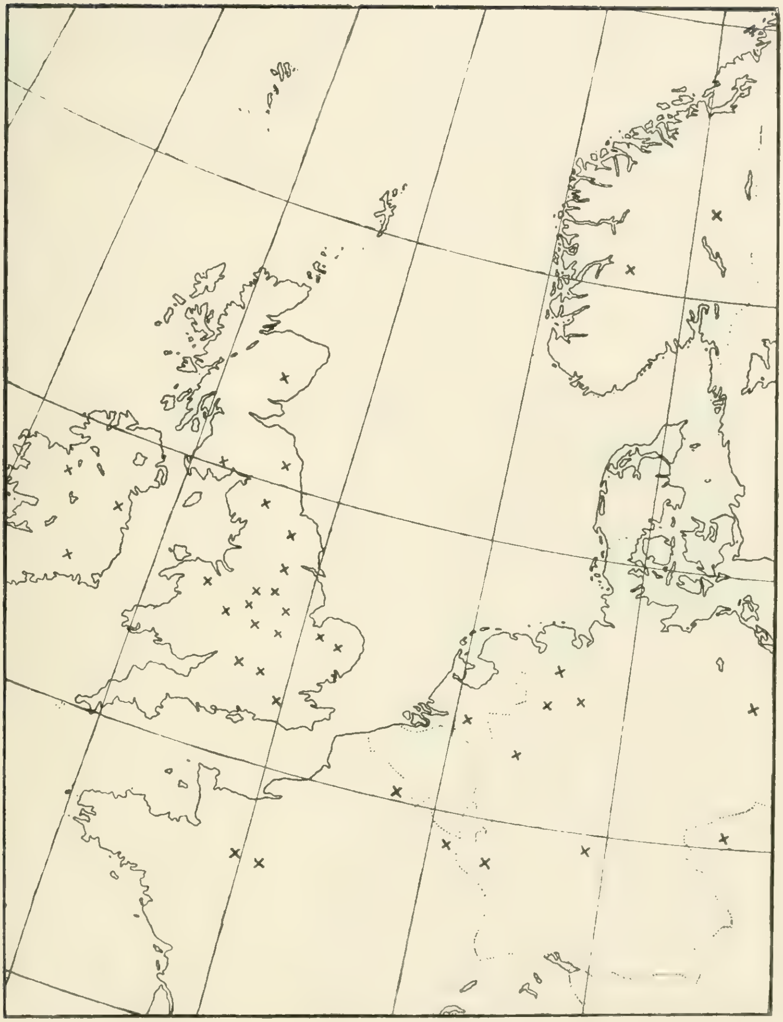
* Morris's "Naturalist," 1855, p. 165.

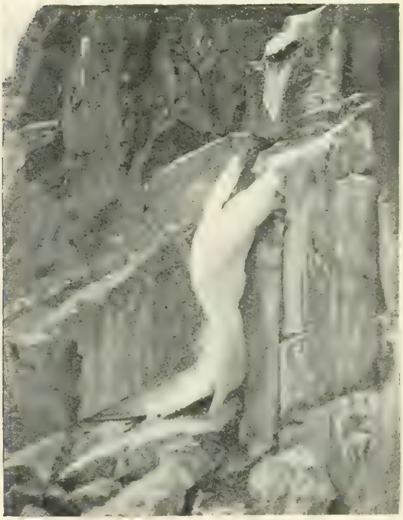
† "Nat. Hist. Northamptonshire," 1712, p. 429.



MAP OF WESTERN EUROPE. OCCURRENCES OF GANNETS INLAND ARE INDICATED BY CROSSES.

France, Germany, Bohemia and Spain.* A map of Western Europe will serve to show some of these occurrences (indicated by a cross), though it does not pretend to give them all, as well as some of the most inland of those notified in England.

Killed when fighting with one another.—In Chapter VII., special emphasis was laid on the pugnacious character of the Gannet during the breeding-season, and I endeavoured to describe the fights which, beginning in play, go on increasing until they become desperate encounters. Not infrequently two lusty adults, probably males, while thus engaged in strife, approach too near the edge, and topple into the sea, which they reach with a big splash. In no ways disconcerted, however, they still hold on to one another with the utmost tenacity. It occasionally happens that in falling, one of the combatants is caught in a fissure of



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* *See* p. 33.

the cliff, and unable to free himself hangs there helpless, unless human aid assists him. Under such circumstances, animation is soon suspended, and the Gannet dies. One of the photographs with which Mr. Campbell has favoured me, exhibits a misadventure of this kind which has befallen a Gannet, which is seen dangling from a fissure by one leg.

For a Gannet to break another Gannet's egg, is probably an unusual event, but I distinctly saw this happen upon the Bass Rock, and that within a short distance—merely a few yards — of where three of us were standing. This was on July 21st, and no doubt it was ourselves who had put the rightful owner off her nest. Perhaps the unlucky parent saw what the aggressor was doing, for she quickly returned and began probing the broken egg-shell — with feelings of regret, I should imagine, for it would have been hatched in a day or two. The snapshot was taken by Mr. C. R. Gurney, a few minutes after the Gannet—which is the top one on the left—had returned to gaze upon her broken egg.*

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* Bass Gannets show very little discrimination about their eggs according to Mr. J. M. Campbell, who has for experiment sometimes exchanged an egg, in full view of the birds, for a Pigeon's egg, on which the incubating Gannet has unconcernedly resumed her position. That they are able to discriminate between an imported egg and their own, he considers extremely doubtful. (" The Scotsman," September, 1911).

CHAPTER XVIII.

THE AGES OF BIRDS.

Age Attainable by Birds—By Gannets—Traditions at the Bass Rock—A Gannet supposed to have Reached the Age of Eighty.

Age Attainable by Birds.—The age attainable by birds and animals is a topic which must have a chapter to itself. I do not mean the average duration of their lives, so much as their possible duration under favourable circumstances. It is a topic on which several learned men have descanted, from the great Lord Bacon* downwards, but the difficulty in getting precise facts—facts, that is, which can be thoroughly relied upon—seems to be insurmountable. The testimony of unimpeachable† witnesses may vouch for a bird having attained the age of forty or even sixty years, but after that errors and uncertainties creep in. One reason why we judge birds capable of living a long time, is because it is almost a necessity that it should be so, for what else is there which can make up to them for their extraordinary liability to accidents, or compensate them for the mortality which takes place among their young ?—a mortality far greater than that which befalls human beings. Especially would it be in accordance with the rule of Nature, that a bird like the Gannet should be long-lived, because here we have a species which does not breed until it is three years old, and then only once a year, laying a single egg. It seems only reasonable to conclude that birds laying a single egg should have some advantage over birds which lay a great many —this is a compensation which we should expect Nature to provide. It is but natural to infer that Gannets would be longer lived than Ducks, Partridges, Pheasants, or Titmice, which begin to breed when one year old, and which lay a great many eggs. In fact, the only other way in which the difference between them could be adjusted is by assuming a much greater mortality among the young of Ducks and game-birds. Something there must be to account for the relative proportions of the numbers of these birds remaining the same, and that something must be either age or a difference of mortality between them. It is not very easy to say which are short-lived species and which are not, but observations taken in Norfolk lead me unhesitatingly to class the Partridge (*Perdix cinerea*) as a short-lived bird. The stock on a manor is often found to be quite unaccountably reduced, from no assignable cause, except the theoretical one of early natural death. On the other hand the Puffin (*Fratercula arctica*) ought by rule to be very long-lived, for it only lays one egg, and yet is probably the most abundant bird in Europe. Whether it is or not, none can say.*

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* "*Longevitas et Brevitas Vitæ in Animalibus.*" Twenty-one species are cited by Lord Bacon, who emphasises the mixed motions of birds as conducive to longevity.

† It is uncommonly hard to be positive about any bird's age after, say, sixty is passed. One of the very few, to my mind, unquestionable instances of a bird surviving in captivity through seventy-four years, is that of Mr. E. Meade Waldo's Eagle Owl (*Bubo ignavus*), which lived in different cages during that period, and reared no less than ninety five young ones, of which the last brood, still living, were hatched in 1899 (*cf.* "Ibis," 1899, p. 30).

The Age Attainable by Gannets.—Intimately connected with the subject of Gannet mortality referred to in the last chapter, is the age attainable by these birds. If we could arrive at some certainty about the latter, we should be nearer to understanding the former, but great difficulties present themselves. If a Gannet has passed the dangerous first twelve months, there seems no reason why, apart from accidents, it should not live a hundred and fifty years.† And if it be so, it would naturally go on breeding nearly to the end, for life in animals does not greatly outlast the period of reproduction.

That Gannets are long-lived has been looked upon as a recognised fact at the Bass Rock from early times. It is a tradition which goes back to 1521, when John Major wrote: "These birds are very long-lived—a fact which the inhabitants have proved by marks upon certain of them."* Tradition has generally truth in it, and the memory of these long-lived Gannets remained in people's minds. The same information about them was given to P. J. Selby when he visited the Bass Rock in 1825,† and to me very much later than that. I found Mr. Laidlaw, the lighthouse-keeper, as well as Mr. R. Kirkpatrick, the lessee, quite ready to discuss the matter. The latter's grandfather used to maintain that it had been proved that Gannets live a long time, and that in one instance at any rate he believed he could certify to a Gannet's having reached the age of eighty. It was a bird which was long known by a structural peculiarity, very likely a deformed beak, but what it was which made it a marked bird Mr. Kirkpatrick has now forgotten.‡§

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* *See* p. 329. A Puffin twenty-one years old in the Færöes, was known to H. C. Müller (C. B. Ticehurst, "British Birds," III., p. 117).

† A Gannet dissected by Mr. C. J. Maynard was believed to have laid about one hundred and forty eggs, and this was judged to be so from the fact that the ovaries were nearly depleted, there being about one hundred and forty ruptured capsules, among which were interspersed comparatively few ovules ("Contributions to Science," 1889, p. 152). This must have been an old bird, for a Gannet does not usually lay more than one egg in a year.

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* *See* p. 176.

† "British Ornithology," II., p. 457.

‡ I am indebted to Mr. C. Kirk for a photograph of a young Gannet, the beak of which, or rather its upper mandible, twists upwards. Mr. Eagle Clarke informs me that it is now in the Edinburgh Museum. Thompson mentions one in which the mandibles crossed ("Birds of Ireland," III., p. 257). Either of these deformities would have been conspicuous at a considerable distance.

§ We are not without statistics as to the age of Pelicans, which are not far removed from the Gannet, and what applies to one may apply to the other. Now these have often been kept in confinement for twenty or thirty years. In 1907, a *Pelecanus onocrotalus* was certified by Dr. J. Büttikofer, to have reached the age of fifty-one and a half ("Zoologist," 1911, p. 279). There is, or was not long ago, a Pelican of thirty-two living in the Zoological Gardens, at London.

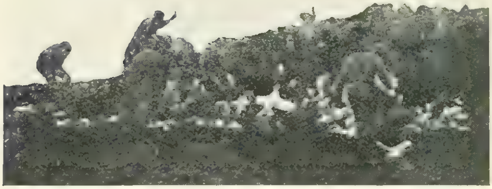
CHAPTER XIX.

GANNETS AS FOOD.

The Uses to which Gannets have been put—Gannets as Food—Their Eggs Eaten—Their Grease Employed as a Medical Unguent, and afterwards as a Lubricant for Machinery—Their Feathers used for Beds.

The Uses to which Gannets have been put.—The uses to which Gannets have been applied are manifold. In the first place, they have in the past been largely employed for food, and for that purpose it was legitimate enough to kill them—especially at St. Kilda, where at one time the inhabitants lived on little else than sea-birds, which they harvested in summer, and preserved in stone cairns. Then they had a value for their grease, which was formerly on account of its supposed curative virtues, and lastly their feathers were turned to account. But all these ways of putting them to man's use have practically ceased now, so far as the British Isles are concerned, whatever may be the case in Iceland.

Method of Taking Young Gannets.—The usual mode of harvesting the young Gannets was the same at the Bass Rock as elsewhere. It was simple enough, but dangerous. One or two bold cragsmen had to creep along the ledges as best they could, with or without a rope, and strike all the young ones they could reach on the back of the head or neck with a cudgel, which was preferred to a bill-hook. It must have been cruel work, for I understand their vitality was very great; but the facility with which their wounds subsequently healed (*see* page 85), if they were not killed on the spot, made some small amends. In the photograph a party of Icelanders, who have landed on a skerry of the Vestmann Islands, are seen at work clubbing young Gannets. It was taken in 1898 by Sir Eustace Gurney, when visiting the Vestmann Eyjar with Mr. N. Annandale. For such dangerous business (as it undoubtedly was upon the Bass Rock and Ailsa), the climber needed to be a man of undaunted nerve, for he held his life in his hands. One who had tried it, confessed to me that there had been moments when the stench and the rays of the sun and the feeling of giddiness, had been almost too much for him; but he had passed through the ordeal unscathed. At the date of Ray's visit to the Bass with Francis Willughby (1661), baskets were employed for making the descent ("Ornithology," p. 19), of capacity enough to hold a boy, but afterwards these were superseded by ropes, which were more suited for the work, and safer also. When enough young Gannets had been killed for local use and for the Edinburgh weekly market supply, the men carried their booty to some overhanging point, and all having been collected, proceeded to pitch them one by one into the sea below, where a boat was waiting at a respectable distance, to row in and pick them up. The men always selected a calm day for choice for their climbing operations, and it must not be immediately after rain, which would make the cliffs slippery. It was also important to see the position of the boat before beginning to throw the Gannets over, or some might drop into it and possibly sink it. Although at the Bass Rock the young ones used to be taken in August, at some



places they were not considered ripe for killing until September; but this would be the case anywhere where many eggs had been previously taken. In 1906, I observed that very few young ones had left the Bass Rock on the last day of August, but they were passing the stage when considered to be fattest.

Method of Taking Old Gannets.—Adult Gannets were sometimes noosed (p. 133), but both at the Færöes and St. Kilda, more generally captured by hand at night (p. 132), which their deafness and the frontal position of their eyes, always deeply buried in the dorsal plumage, rendered easy. The islanders considered them good for eating in the spring (p. 266), but after the duties of incubation had commenced they grew lean. As far as can be ascertained now, adult Gannets were never used for food at the Bass Rock, where it was always the policy of the tenant to protect them in order to insure more young ones—a policy which was too often defeated by the heartless conduct of many so-called sportsmen, who shot the nesting-birds from boats. This was not difficult, for the sight of a wounded Gannet on the water would act like a decoy, and its cries soon draw others to share the same fate. Gannets used to be taken by the seaman's ruse of floating a small board, loaded enough to sink an inch or two below the surface, whereon was nailed a herring. This was an alluring bait, and if a Gannet pounced down, it would generally perforate the board, or break its neck. It is curious that a dead fish should have so much attraction for them, but so it is. This rather cruel stratagem must be one of very old standing, many authors alluding to it, although only one had seen it done—Mr. R. Gray ("Intellectual Observer," 1864, p. 119). The first who mention the practice are Ray and Willughby, writing in 1676, and they describe it as being a trap of the Cornish fishermen, a fact which one of Ray's Itineraries shows that they ascertained, when at Padstow in June, 1662 ("Memorials of Ray," p. 185). I once received a Gannet which had been captured in this way; the poor bird, though still alive and fairly strong, had lost one eye by contact with the board on which it struck: but with a liberal supply of fish, it lived for some years on my pond.

Number of Gannets formerly Taken.—As regards the number of Gannets, of which nine-tenths were young ones, formerly killed at the different breeding stations annually, the following figures were at one time reached, but probably little, if at all, exceeded :—

The Bass Rock	1,900
Ailsa Craig	500
St. Kilda Islands	14,000
Sulisgeir	3,000
Sule-skerry Stack	1,000
The Færöes	900
Vestmann Islands	3,000
Eldey	4,000
	28,300

Gannets as Food.—There was a time when the young of any sea-fowl which put on fat abundantly, were thought to be good-eating by those who lived near enough to their haunts to benefit by them. Salted Puffins were eagerly consumed by our not over-particular ancestors, and young Shearwaters were drawn out of holes with long hooks. The Puffins possessing a distinctly fishy taste, appear to have been permitted by the Romish Church in some places, to be eaten in lieu of fish. It was evidently to this indulgence that Richard Carew alludes when he speaks of the Puffin as "being exceedingly fat, kept salted, and reputed for fish, as coming nearest thereto in their taste."* Young Shearwaters might also be eaten in Lent without prejudice.† Young Fulmar Petrels were rated highly by the dwellers on St. Kilda, and are still the standing dish there, although to an Englishman their taste is insipid.* The squab of the Cormorant was too rank, but half-fledged Black-headed Gulls were accounted a delicacy, and were caught in nets.† Young Gannets were partaken of principally in the neighbourhood of the Bass Rock, and in a less degree at Ailsa Craig. At one time they were gathered at the Skelligs and brought in barrels to the mainland,‡ but there is no record of their being eaten in modern times on Lundy Island, or ever brought from Grassholm for that purpose.

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* "Survey of Cornwall" (1602).

† "The Ornithology of Francis Willughby," p. 334.

At the Bass Rock documents do not go back far enough to tell us when the systematic harvesting of the young Gannets began. We hear of the great value of their grease in 1493, but the Charter of 1316 does not mention them, and we are left without any particulars until the sixteenth century. That sea-fowl are the oldest inhabitants of the Bass, no one doubts, or that young Gannets were a part of the sustenance of Saint Baldred the hermit, who died there A.D. 606. But it was not until 1521 that we learn anything about this feathered harvest being thought worth the lifting, although we note that ten years before that, young Gannets had been considered desirable meat for the household of King James. In 1525 "auce solanes" were served to his son James V., at Holyrood, and in 1529 the careful larderer bought them for the King's hunting seat in Fife, Falkland Palace, where birds of all kinds, and Geese in particular, were in request for those who sat at the royal table.*† In 1592, the rights of the laird of the Bass had so swelled in importance that it was necessary to apply to Parliament for their protection, and an act was thereupon passed, in which special mention was made of the Solan Geese, which no fisherman or skipper residing at Dunbar, North Berwick, or any other town in the vicinity, was henceforth permitted to take by hook or by net, nor might they kill any profitable fowl which repaired to this isle to breed.‡

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* "St. Kilda," by J. Wiglesworth, pp. 20, 66.

† "The Natural History of Staffordshire," by R. Plot.

‡ "The Fowler in Ireland" (1882, p. 262) and "Natural History of Ireland" (Birds III., p. 264).

For a long time after this, in spite of an English monarch's unfavourable opinion of them,§ the esteem in which young Gannets were held abated but little, if we may judge

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[*] *See* page 177.

[†] Several sorts are entered by the careful larderer in his accounts, viz.: *Auca campestris* (Wild Goose, perhaps the Pink-footed Goose), *A. silvestris* (Wild Goose of some sort), *A. domestica* (Tame Goose), *A. virides* (green or young Geese), *A. pasta* (a fed or fatted Goose.) Seal was purchased for the larder, whole or in quarters, also Porpoise.

[‡] *See* p. 194.

[§] Charles II. was heard to remark that there were just two things which he did not like in Scotland—the Solan Goose and the Solemn League and Covenant.

from such contemporary evidence as the Water Poet's praise in 1618, and the Lauderdale accounts (1674-8), and from the high rents paid to Sir Hugh Dalrymple, and no doubt the nestlings were systematically gathered upon the ledges, at stated intervals, weather permitting, every year. When Thomas Pennant visited the Bass Rock in July, 1769. he found all its birds strictly preserved, no one being permitted to shoot at the Gannets, "the place being farmed principally on account of the profit arising from the sale of the young of these birds, and of the Kittiwake . . ."* The Gannets were regularly sold at the Edinburgh poultry-market, and a newspaper of the period gives John Watson as the name of one of the salesmen. This poultry-market was situated on the same platform with the veal-market, and had communication by flights of stairs with the markets below.†

The young Gannets were no doubt neatly plucked and trussed for the spit, and doubtless their appearance when so prepared was fairly inviting. Yet they must have been fishy dainties at best, a mixture of fish and fowl unsuited for refined palates: "saporem ex carne et pisca mixtum," as Sir Robert Sibbald has it; but this combination of flavour was their recommendation in Scotland, and they found favour on the tables of the wealthy as a "whet" before meals.

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* "Tour in Scotland," I., p. 60.

† "Picture of Edinburgh," by J. Stark, p. 295. I am indebted to Mr. W. Evans for an extract from it.

The first writer to name a price for young Bass Gannets is Blaeu (quoting Robert Gordon), in 1654: who says: "Those of Edinburgh pay 25s. for one Goose;" but the Scotch shilling was only equal to about a penny, so that they were really 2s. 1d. apiece.* In 1661 John Ray tells us that they fetched 1s. 8d. plucked, which he thought was a very dear price for them.† In 1674-8 the Lauderdale accounts give seventeen pence as the price of one Gannet. In 1710 Sir Robert Sibbald puts it at twenty-four pence, which is the top figure. After that the price kept for some time at twenty pence, which is the sum named by Dalrymple's factor in 1764-7; by the author of "The British Zoology" in 1769; and by Selby in 1825. In 1848 it was 1s. at Canty Bay, according to Wolley.‡ In 1849 it had dropped to 9d. (Prof. Fleming), which was still the charge on the spot in 1860 (Harvie-Brown). But at length Scottish taste changed, young Gannets were voted rank and fishy, the demand for them began to fall off, their grease and feathers also were in less request, and with a decline in their value the rent of the Bass Rock naturally declined also; so that in 1820 what had once fetched £200* only let for £35, and in 1876 I was told on the spot, that the owner received no more than £20.

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* Page 213.

† Page 206.

‡ "Ootheca Wolleyana," II., p. 453.

Up to about 1885 it would seem that there was still call enough for young Gannets to make it worth the while of the tenant of the Bass, to continue the gathering of them. More particularly were they asked for in years of abundance of corn, when Irish labourers came in plenty to Haddington, as they were in the habit of doing about harvest time. Then during the month of August a brisk trade went on at Canty Bay, where two hundred young Gannets, landed in boats from the Bass and afterwards cooked in brick ovens, are said to have been sometimes consumed at a single feast.† Besides this, a good many were sent away, for the lessee of the Bass—who in 1860 was Mr. Adams, and in 1876 Mr. Kendal, and after him Mr. Downie—was in the habit of receiving orders from a distance. These chiefly came from large commercial centres, such as Edinburgh, London (the Haymarket Hotel, etc.), Sheffield, Newcastle, Birmingham, and Manchester, where the young Gannets were consumed at the commoner eating-houses. Whether in all cases the consumers knew what they were eating is doubtful. Gannets were generally called Geese at the Bass Rock, and as Scotch Geese they might easily be palmed off on the unsuspecting English customer. Others were hawked about the country-side in carts, fresh as well as salted, or retailed at various Lothian markets to anyone who would buy them. Plucked and cooked, they were retailed at 10d. each ; plucked and raw, with the insides filled out with straw, at 6d. Great must have been the labour of the plucking, chiefly done by women, of whom Mr. Kendal told me he employed five ; and dense must have been the cloud of feathers in which these worthy dames sat at their work, for which they were paid eighteenpence a day.

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* Page 250; the rent named by Swave is too high to be credited.

† "Land and Water," February 20th, 1869. The ovens were still *in situ* in 1876.

At the present day no one eats Gannets from the Bass, and the young leave the cliffs unmolested, being no longer deemed fit for human food.

At St. Kilda.—In this remote island of the Hebrides, formerly known as Hirtha, Gannets must have been freely eaten ever since the islanders, who were certainly established there in the fourteenth century, possessed a boat to take them to Borrera and Stack Lii, for no Gannets breed on St. Kilda proper. We first hear of sea-birds being used here for food in 1549.* But long prior to that, McCloyd's factor or steward had doubtless been sent from Lewis,* once a year or oftener, to collect some portion of his employer's rent in "wyld foulis reisted," i.e. dried wild-fowl, a term which probably included Gannets. But a diet for five centuries composed only in part of mutton and meal, and more largely of "wyld foulis" and their eggs, was not unattended with risk to the islanders, who in those days numbered 180,† with no means of salting their sea-fowl, which they merely dried in the sun, and piled under cairns of loose stones. There they lay in all weathers until the winter time, or longer, so Martin tells us, "without salt or pepper" (*l.c.*, p. 80), with the natural result that they soon became insanitary, and in 1684 a leprosy broke out, from which two families were still suffering at the time of his visit.

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* *See* p. 117.

The practice of salting sea-birds was probably unknown —or if known, not applied for lack of salt—in St. Kilda until the beginning of the nineteenth century. When salting commenced, the stone shelters were discarded for barrels, and the young Gannets, Fulmar Petrels, etc., after being carefully plucked and eviscerated, were packed like fish.‡

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* The McLeod who is the present head of the Clan, resides at Dunvegan, Skye.

† In 1911 the census return was males 40, females 40; the population has never been less than 71.

‡ "Ann. Scot. Nat. Hist.," 1905, p. 145; and "St. Kilda," by J. Wiglesworth, p. 67.

Now the Gannets in this vast breeding-place, which is the metropolis of the species, have an easy time of it, being unmolested in September, as they are not required either for their flesh, their feathers, or their grease.

At Ailsa Craig Gannets are no longer eaten, but at Sulisgeir and Sule-Skerry they are still collected in some quantities for consumption by the fishermen and peasantry of Lewis.

During the summer of 1911, two boat-loads of young Gannets arrived at Ness from Sulisgeir and the Stack of Sule-Skerry, as I learn from Mr. Macleod, the harbour-master of Ness, which were salted after the breast-bone had been removed, and then laid flat in barrels.

In the Færöes, I learn from Mr. J. Olsen, young Gannets are still relished, some being boiled and eaten hot, others being pickled for a few days, and then dried and eaten raw.

Gannets' Eggs.—In St. Kilda Gannets' eggs were formerly held to be good alike for food and physic, and as recently as 1902 Mr. J. Wiglesworth found that the top of Stack Lii had been cleared of them by the natives.* There is no call for them at the Bass Rock for eating, but visitors are glad of some as specimens. At Ailsa Craig they are more appreciated, and a good many are eaten. I have once tasted one boiled hard, and thought it fairly good.

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* "St. Kilda," p. 49.

Use made of the Grease.—Since very early times the Gannets on the Bass Rock have been still further turned to account for their fat, of which they possess a great quantity, and which can be easily boiled down into the consistence of oil. In the sixteenth century Gannets' fat was thought to possess extraordinary healing qualities, and was used in the preparation of drugs intended for the cure of gout and catarrh. Almost our first knowledge of the sea-birds on the Bass Rock, is a claim put forward in 1493 against the then owner for sundry barrels of its Gannets' grease—*pinguedinis auium silvestrum* as the ancient commission (still preserved at Edinburgh) has it.* The matter must have been considered of prime importance, for it was referred to no less an arbitration than that of the Pope of Rome. Then after a lapse of fifty years, we have the encomiums passed by Dean Turner in 1544 on Gannets' grease, which he terms a salve most valuable for many a disease: but this and Hector Boece's testimony have been already quoted at length, and need not be repeated.†

In "Ein Mittelenglisches Medizin Buch," a collection of doctors' receipts, principally taken from MSS. of the fifteenth and sixteenth centuries, Gannets' grease is classed with that of badgers and boars, and all of them recommended, when made up together into an ointment, as a cure for gout.* The attention of medical men seems to have been no longer drawn to it after the sixteenth century,

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* p. 171.

† pp. 180, 183.

GANNET COPPER *in situ.*

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* Ein Mittelenglisches Medizin Buch, edited by Fritz Heinrich : Halle, 1896 (p. 202).

PRO GUTTA.

Item unguentum. Also an oyntement for the same. R tak cattes grece, ganates grece, banfones grece, bores grece, mery of an hors, 7̄ grece of a dogge, 7 alle these tempre togeder.

seeing that neither the great physician Harvey (1641), nor the observant John Ray (1661), nor the Dutchman Blaeu (1662), make any allusion to its supposed curative virtues, so it probably fell into disuse. Notwithstanding, in 1766 ten Scots gallons were still worth £2 13s. 5d.,* implying that even then it possessed some medical value, or it may have been used for cooking purposes; at any rate, the price is a high one.

Finally this once valued lubricant was put to no better use than the greasing of carriage-wheels, cart-axles, threshing machines, and other agricultural implements, for which its cheapness was its principal recommendation to farmers in Haddington.†

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* *See* p. 251.

† The process of boiling down the Gannets' grease at Canty Bay, a small hamlet lying opposite to the Bass Rock, has already been briefly described (p. 254), but I should like to express my obligations to the Rev. H. N. Bonar for photographs taken in September, 1911, of one of the cottages, where these boiling operations went on. This cottage still contains one of the Gannet coppers *in situ* (*see* p. 466), and is an interesting reminiscence of an industry not likely to be revived. One of Mr. Bonar's photographs shows the wall, and open space where the Gannet-roasting ovens stood when I was there in 1876, and the little chimney just above the cottage door which served as a vent for the copper's fire, also the fireplace where the young Gannets were singed as the quickest way of getting rid of their down, and the metal spout through which the grease from the copper ran. The whole business—both the boiling and the roasting—was such a highly odoriferous one, that Mr. Booth, who resided for three months in one of the fishermen's cottages, says the place and its inhabitants used to reek with the scent of Gannets' fat, which I can readily believe.

At St. Kilda.—In St. Kilda Gannets' grease was at one time largely used, but it does not seem to have been kept apart from the fat of the many other sea-birds with which those islands abound. Gannets, Puffins, Guillemots, Razorbills, and Fulmars, all contributed. They were flayed, and their fat peeled off in strips, or their bodies boiled down together to obtain it. Some of the fat was made use of by the islanders, but the greater part was packed in kegs or barrels for use in the Hebrides, where it was a favourite sheep-smear with the farmers, before chemicals superseded it. Very likely it was also employed by the natives for human ailments, and a notable instance of their belief in its curative power is detailed by one John Morisone, a firm supporter of its efficacy in the eighteenth century, who, writing of the dwellers in small tenements on North Rona, on the west coast of Scotland, says: "Of the grease of those fowlls (especiallie the Solind Goose)* they [the inhabitants of Rona Island] make an excellent oyle, called the gibanirtick, which is exceeding good for healing of anie sore ore wound ore cancer, either on man or beast. This I myself found true by experience, by applying of it to the legg of a young gentleman which had been inflamed and cankered for the space of two years, and his father being a trader south and north, sought all phisicians and doctors with whom he hade occasion to meet, but all was in vain. Yet in three weeks tyme, being my hous, was perfetlie whole be applying the forsaid oyle. The way they make it is—they put the grease and fatt into the great gutt of the fowll [the expandable proventriculus of the Gannet], and so it is hung within a hous untill it run in oyle." *

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* Which they obtained from Sulisgeir, near by, the rock described on p. 150.

Melted Gannets' grease must have been almost equivalent to a fish oil, and probably possessed some of the properties of cod-liver oil; its medicinal value for outward application, therefore, need not necessarily have been groundless.

Use Made of the Feathers.—But the commodities afforded by the Gannets did not end here, for their feathers were good enough for cheap pillows, cushions, and feather-beds. Possibly they had not the softness and lightness of feathers from the domestic Goose, but they possessed elasticity, and did not mat too easily. It was the young Gannets' feathers which were used for beds, but all agree that whether from young or old, their retention of a strong scent was so great as to be an almost insuperable difficulty, yet, by exposing them to a hot sun or to the heat of an oven, it was possible to overcome it temporarily. At most breeding stations where feather-collecting went on, the supply included the plumage of Puffins, Guillemots, and Razorbills, and at St. Kilda of Fulmar Petrels; but at the Bass Rock Gannet-feathers alone were taken, as far as I have been able to ascertain. It was an old industry there, of very long standing, if a small one.* In 1767 the value of a stone of Gannets' feathers was ten shillings sterling at the Bass.† In 1874 it was eighteen shillings (E. T. Booth). Eighty Gannets, if not more, were needed to produce a stone (24lb.),‡ and three stone of feathers were required to make a bed of moderate dimensions.

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* "Description of the Lews" by John Morisone, as given in The Royal Physical Soc., Edinburgh, "Trans.," 1883-5, p. 58, and from there quoted in "A Fauna of the Outer Hebrides," p. xl. Mr. Eagle Clarke informs me that the stomach of a Gannet is still a favourite receptacle at St. Kilda for the storage of Fulmar oil, and that as recently as September, 1911, he saw a number of these skin bottles on the island, thus employed.

At St. Kilda.—When the Rev. Neil Mackenzie took up the pastorship of St. Kilda in 1829, the feather-trade was inconsiderable, but when Mr. J. Wilson went there in 1841, it appears that two hundred and forty stone was payable by the islanders as rent to the proprietor, Mr. Macleod. In 1847 each family had to contribute seven stone ("Zoologist," 1848, p. 2058). Subsequently we learn from Mr. Wiglesworth, trade expanded, and enormous quantities of feathers were exported.* Fulmar Petrels predominated, but doubtless the dark plumage of the "Guga," or young Gannet, played no unimportant part in the annual consignment. In 1877 Seton writes: "The price paid by the present factor for feathers is, per stone of 24lb., five shillings for grey, and six shillings for black feathers, which it appears can be sold in Edinburgh or Glasgow at from seven to eight shillings per stone."†

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* Feathers are mentioned as an item of great value by Swave in 1535, and by John Caius in 1570. *See* pp. 181, 187.

† p. 251.

‡ An English stone is less than the Scotch weight.

From 1877 to 1897 the demand for sea-birds' feathers appears to have been pretty steady. In 1894 Mr. Steele Elliott found the factor for St. Kilda receiving about two hundred stone yearly,‡ but since that date it has gradually dwindled, and they became less worth gathering, while elsewhere the trade has died out altogether. In 1900 a London merchant wrote to Mr. Harvie-Brown, that he could still give ten shillings a stone for Gannets' feathers; but now the very name of Solan Goose seems to be forgotten in the trade.§

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* "St. Kilda," by J. Wiglesworth, pp. 19, 50, 67.

† "St. Kilda past and present," by G. Seton, 1878, p. 134. The black feathers would have been principally Puffins' and Guillemots'.

‡ Equivalent to 90,000 birds the size of a Puffin ("Zoologist," 1895, p. 285), a truly prodigious slaughter!

§ Mr. Mackenzie, factor for St. Kilda, writes me that he still has the produce of two seasons waiting for a purchaser. Gannets' feathers are reckoned of no value in the Færöes and Iceland (*see* pp. 269, 284).

The Breast-bone and Gullet.—Long ago, when lamps were hard to come by, Gannets' breast-bones served the St. Kildans for that purpose, for which their shape was not ill-adapted, while the stomach and gullet, which are of great size, distended and dried, still make excellent skin-bottles for holding their much prized Fulmar oil. Even that does not quite exhaust the ideas which have suggested themselves, for pipe-stems have been made by ingenious men out of the ulna-bones of Gannets' wings, and were to be bought for three a penny. Their webbed feet, pliant enough when the bird is alive, but which soon become hard, have been converted into receptacles meant for purses or tobacco-pouches. Someone even tried to make slippers out of their skins, and tippets out of the young ones' down, but not very successfully.

CHAPTER XX.

PLUMAGE.

The Gannets' Plumage—Description of the Nestling—Of the Young—Of Intermediate Stages—The Plumage of an Adult—Period of Moult—Pterylosis—Weight of a Gannet

Description of the Nestling.—A young Gannet, when just liberated from its egg, is described by Mr. J. C. Walker—who successfully acted the part of *accoucheur*, setting some of them free from their egg-shells rather before their time apparently—as being quite black, with a sprinkling of powder-like down about it, with a big head, a fat body and tiny webbed feet, perfectly bald, about four inches long, and very lively.*

The mouth, I may add, on the authority of Mr. O. G. Pike, is already of no inconsiderable dimensions, and of a dark bluish-grey colour. In twenty-four hours more down begins to be visible, but it is a fortnight before the little creature is clothed with it. Mr. W. P. Pycraft is of opinion that the Gannet has two generations of nestling-down, though whether this is made up of pre-pennæ only, or pre-plumulæ only as in the Cormorant, or of a mixture of both, he is unable to say at present.† On the seventh day the eyes are open, and are dark hazel, the beak dull slate, white at the point.*

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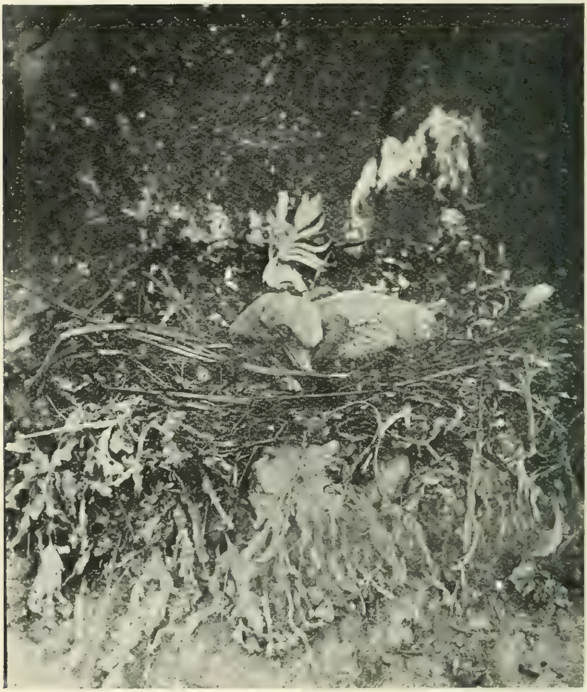
* "Zoologist," 1868, p. 1366.

† W. P. P. *in litt.* I am largely indebted to Mr. Pycraft for help in this chapter, and the next.

The first illustration is the portrait of a very young nestling, photographed on the Bass Rock by Mr. Edgar Evans, on June 24th, 1899 (photograph No. 1). This nestling, which exhibits a little down, chiefly upon the back, and



[*Edgar Evans, Phot.*

NO. 1. NESTLING GANNET.

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* "Rough Notes," by E. T. Booth, Vol. III.

was perhaps eight days old, had just strength enough to raise its head for a few seconds, and drop it again. From the careful observations made by the late

[O. G. Pike, Phot.

NO. 2. NESTLING GANNET.

Mr. Booth, it appears that the tail-feathers are visible on the eighteenth day, and the wing-feathers on the twenty-first, and the scapular-feathers, I may add, also sprout about the same time (photograph No. 2). As the young Gannet increases in bulk, its beak grows rapidly, not only getting larger but also more pointed; meanwhile the whole of the bare skin which may be termed its face, remains quite dark (photograph No. 3, age about seven weeks).

Plumage of the First Year.—The growth of the young of most sea-birds is slow, but that of the young Gannet is exceptionally slow. At nine weeks old the down is at last nearly all covered up, and we have a bird of a blackish slate-colour, flecked all over with little white spots (see the photograph on p. 373). At about twelve weeks these white spots (which are in reality triangular spots at the tips of the feathers, extending over the body, head, and wings) have increased both in size and number, not by the addition of more feathers, but by further growth of feathers already through, being especially numerous on the head. This was so in a young Gannet picked up in Yorkshire, believed to be twelve weeks old, which afterwards lived nearly two years in captivity, and served for most of the notes on plumage which follow.*

At what I considered to be four months old, the white

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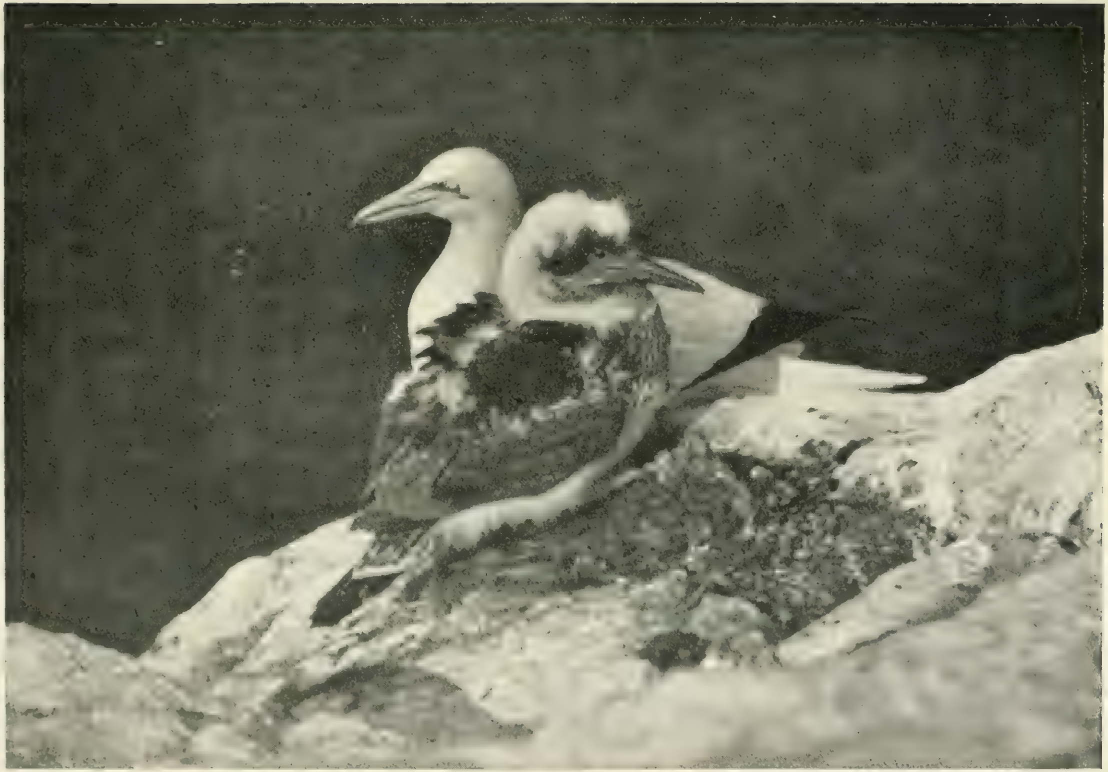
* It was found at some distance inland, with an injured wing, on September 29th, 1906, and taken to Mr. W. H. St. Quintin, from whom it was received on October 1st. It must be understood that its age was conjectural, but I am pretty sure that it was not less than ten weeks old.



[J. C. Adams, Phot

NO. 3.—NESTLING, ABOUT SEVEN WEEKS OLD.

spots upon this young Gannet were less numerous, and were becoming distinctly smaller, being presumably worn by abrasion. At five months its entire plumage had grown darker (photograph No. 4). At six months there was not any further change worth registering; nor at seven months. At eight months all its feathers were darker, and the moult had set in, shed feathers being pretty numerous in its enclosure. At nine months its new tail-feathers were growing—very large and very stiff when compared with the limp rectrices which they replaced. At the same time new feathers were discoverable upon the back, and these were black, with small white spots on the tips of a few only. Some white colour was apparent at the back of the neck also. At ten months the white on the neck had spread, and was beginning to cover the throat and breast (photograph No. 5), and at eleven months the whole of the under-parts were white.

Plumage of the Second Year.—The young Gannet was now twelve months old, its forehead retaining many dark speckles, but there were no longer many spots of white to be seen on the back (photograph No. 6).* Its general

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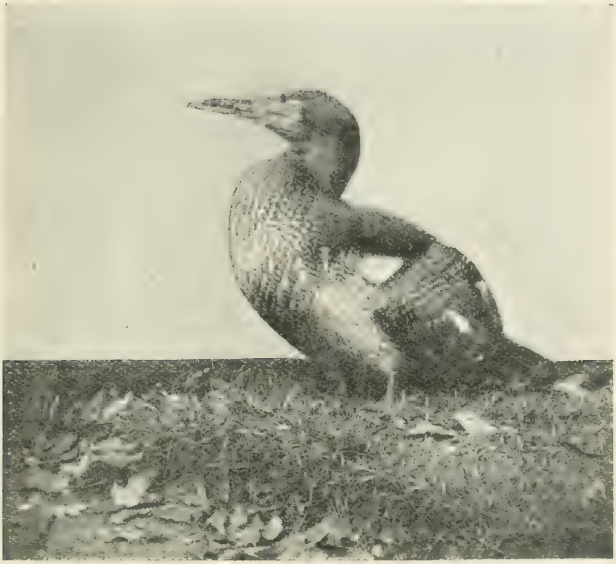
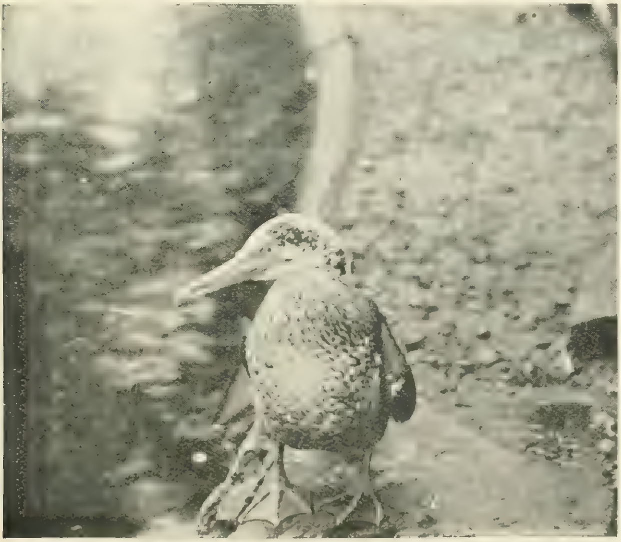
* The age of one year has not been inaptly termed the piebald stage of a Gannet's life; such a bird would be called at St. Kilda a *Fathach* according to Mackenzie ("Ann. Scot. Nat. Hist.," 1905, p. 145), but Mr. Harvie-Brown says that this name, meaning a fatling, is applied to the young Shearwater and Fulmar Petrel as well at the present day.

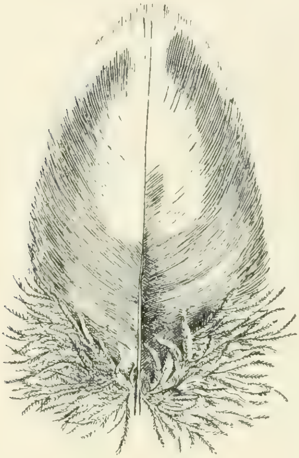


NO. 4.—A YOUNG GANNET, BELIEVED TO BE 5 MONTHS OLD.

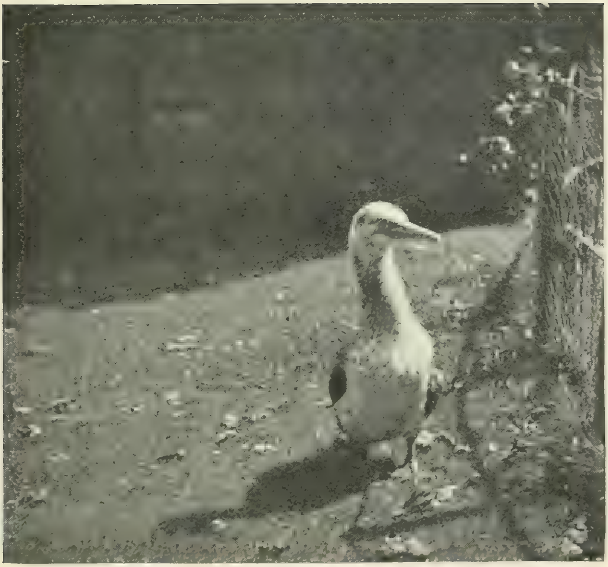


NO. 5.—THE SAME GANNET AT 10½ MONTHS.

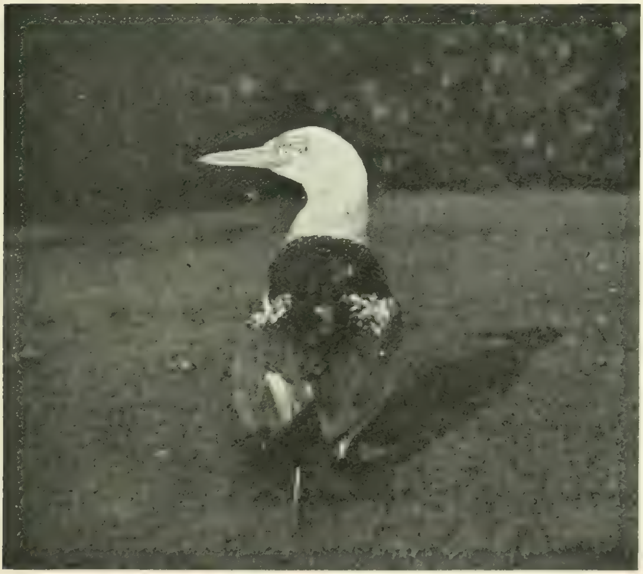
plumage was similar to that of the three from Grassholm, briefly described on p. 432. By the time it had reached sixteen months, there was not a spot of white on my young Gannet's back, which was nearly black, but two-thirds of its head and neck were now quite white. Although the moult seemed to be finished, it was evident that there was still some change of colour going on, either by fading or abrasion. The only part of its body which remained in the spotted plumage now was the lower part of the belly. At seventeen months (photograph No. 7), the head and neck were nearly white. At twenty-one months (photograph No. 8), the lesser upper wing-coverts and a part of the scapulars were white also, and three white spots of some size were visible on the back. At twenty-two months a shade of yellow came out on the head and neck. At twenty-three the white spots or blotches on the back were the size of a florin, and several new ones had appeared upon the wing-coverts. At twenty-four the blotches were still larger, and at twenty-five months the



BREAST-FEATHER SHOWING CHANGE OF COLOUR.



NO. 6.—THE SAME GANNET AT 13 MONTHS.



NO. 7.—THE SAME GANNET AT 17 MONTHS.

bird, which had been in excellent health until the last fortnight of its life, unfortunately began to droop and died—August 7th, 1908—and my observations came to an abrupt end. The tinge of yellow upon its crown and nape had little if at all increased (which I attribute to the effect of the confinement which must have retarded it), and there were still remaining a few brown feathers upon the belly, but they had faded.

Plumage of the Third Year.—When a Gannet is about twenty-six months old it exhibits a yellow occiput and a partly black back, forming a handsome conjunction of colours. When twenty-eight months it should have (if the normal moult has been adhered to) nearly acquired its complete white plumage, but there still remain a few small patches of black on the lower part of the back, and upon the wings (photograph No. 9). The black tail* is the last portion of the immature plumage to be shed ; in a

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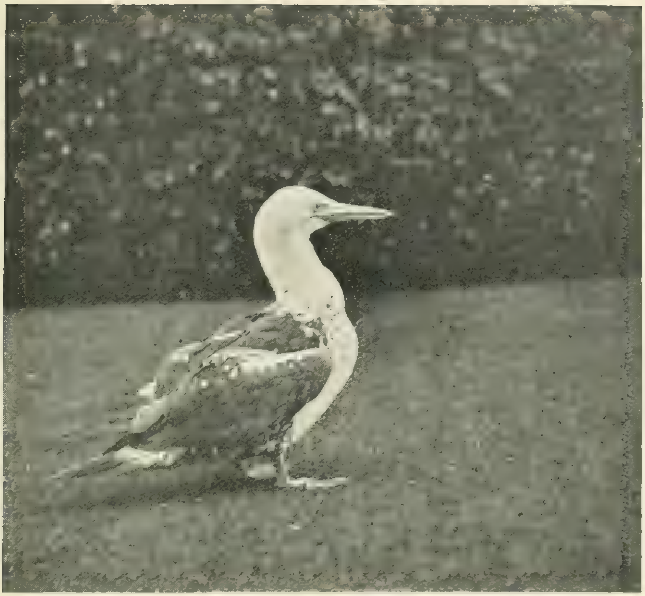
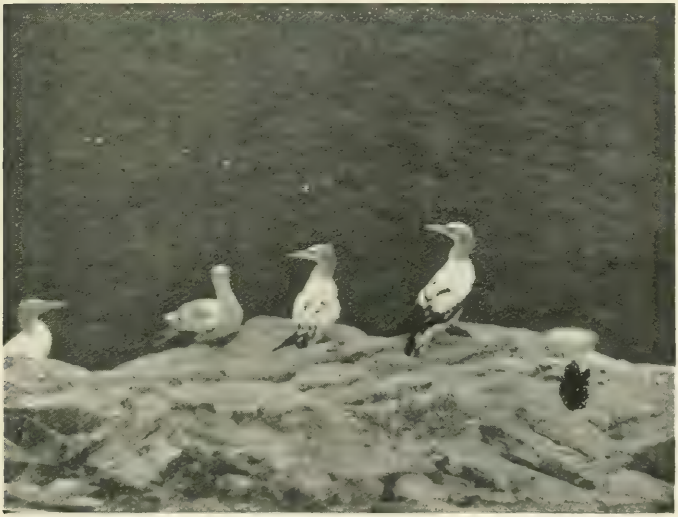
* A black-tailed Gannet which came from Iceland is figured in Gould's "Birds of Europe" (1837, Vol. V.) under the designation of *Sula melanura* Temminck, but in 1840 Temminck had found out the true explanation of these black-tailed birds ("Manuel d'Orn.," 2nd edition, 4th part, p. 569). It was also upon a black-tailed Gannet that Baldamus founded his *Sula lefevri* ("Naumania," 1851, Pt. IV., p. 38). It should nevertheless be mentioned that Mr. Ogilvie-Grant—the author of the *Steganopodes*, etc., in the British Museum "Catalogue of Birds," Vol. XXVI—considers Prof. Macgillivray's description of a black-tailed Gannet, which was killed at The Bass in May, 1831 ("Brit. Birds," V., p. 420), to have been really taken from a *Sula capensis* (*t.c.*, p. 429)



NO. 8.—THE SAME GANNET AT 21 MONTHS.



[O. G. Pike, Phot.

NO. 9.—GANNETS ABOUT 28 MONTHS OLD.

moult which is normal, the two middle rectrices, which are the longest of the twelve, being the final ones to go. As to the period occupied in assuming the adult plumage, some very different opinions have been expressed. Macgillivray thought it was complete in about two years, Faber and Ogilvie-Grant give it three, Selby and Olafsen four, Booth (a good judge) four and a half, Seebohm five, and Howard Saunders six.* My observations, which I own have been somewhat limited, lead me to think it is usually completed in two years and a half, but that some individuals take three years.†

Plumage of the Adult.‡—White as snow, save for its ten black pinions in either wing, a Gannet in the purity of its full plumage claims our admiration as few other birds can do; nor is it diminished on observing the delicate straw-colour which tints its head. The body of a Gannet is of a somewhat elongated form, the neck long, the head rather large. The breast-feathers are convex in shape, which helps to break the shock of contact with the water, while the hair-like texture of the neck-feathers may be meant to facilitate gliding through it. The wings are narrow for their exceptional length, the primary-quills, ten in number, black, very stiff, and tapering to a point. The bastard-wing is black, and below it there is a patch of white about three inches long. The secondary-quills or cubitals, twenty-six or -seven in number (for the Gannet has a very long fore-arm—*radius* and *ulna*),* are short, broad, rounded at the ends, and white in colour.† The tail is graduated or cuneiform in shape, and consists of twelve feathers with uncommonly stiff shafts, much used in steering through the air.

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* Yarrell, "British Birds," IV., p. 160.

† A Cormorant in Mr. J. L. Bonhote's aviaries did not attain its full plumage until the fifth year ("The Field," Nov. 27th, 1909).

‡ There are various plates of the Gannet in published works, and a few commendable illustrations of its changes of plumage, and especially must honourable mention be made of the six large plates by Mr. E. Neale in Booth's "Rough Notes on Birds" (Vol. III.).

§ Yellow in animals is a very evanescent colour, which is perhaps why this tint varies so much in individual Gannets; but it is always more intense in spring and summer, and is sometimes almost absent in winter. Similarly in the Spoonbill and Great Bustard the buff patches are seasonal.

Authors agree that there is no difference in the sexes.

The Bi-annual Moult.—The moult takes place in March, April and May, and again in August or September; it seemed to go on a long time in my tame Gannets, but Mr. G. Bolam thinks it is only in full moult in the autumn. In my birds, not only were the body-feathers shed, but also those of the tail and wings, and no irregularity was noted in the casting of the primaries.* Besides the moult, there was evidently a constant wearing away of the barbules and barbicels of most, or all, of the feathers. A young Gannet, the property of the Zoological Society, examined on November 25th, 1911, when it was lent to me by the Society, being then, as was believed, eighteen months old, showed many new feathers coming upon the back; but there were no shed feathers in its enclosure (although careful search was made then and on subsequent days), which there would have been if it had been in moult. It died on January 5th, 1912, when the opportunity was taken of submitting one of the wings to Mr. C. B. Ticehurst, who made a minute examination of the secondary-quills, which were moulting irregularly, as shown in the cut, drawn to his diagnosis.

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* *See* p. 335.

† The cubital wing-coverts of *Sula* are figured in Mr. J. G. Goodchild's article on this subject ("P.Z.S.," 1886, p. 199), where it is stated that in style they most resemble those of *Fregata*, *Puffinus*, and *Diomedea*.

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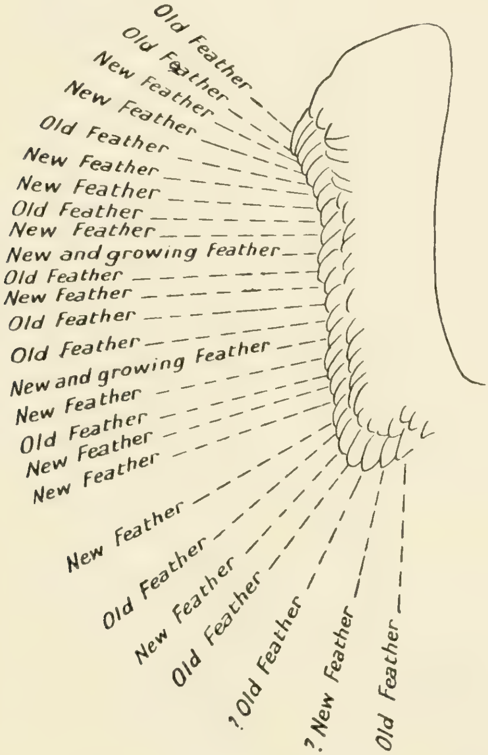
* Whether they were actually shed in pairs, I am not sure. Mr. C. B. Ticehurst, to whose notes I am much indebted in this work, describing a Gannet obtained in Suffolk, on October 5th, 1911, writes that the primaries seemed to be cast very slowly, and not in an orderly fashion, the two outer feathers being old ones, and the third in quill, the fifth and sixth old ones, the rest new. The secondaries in this specimen, he adds, were not regular or even the same in the two wings; in the left one the twelfth and fourteenth feathers were in the quill, while in the right wing the seventh only, some of the remainder being new and some old. The tail was irregular, but the same on both sides. It appears from Mr. J. L. Bonhote's observations that the Cormorant moults in November and April, and that the primary-quills in this species are not cast in both wings synchronously ("The Field," Nov. 27th, 1909). That there is a regular order in which feathers drop out in most birds is clear, and this is conspicuously the case in the Partridge (L. Bureau, "Rev. Franç d'Ornithologie," 1910, p. 209).


Old Feather
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New and growing Feather
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Accidental Variation in Plumage.—Doubtless albinisms exist occasionally in the Gannet, as in every other bird. None are recorded, but a case in which the lack of pigment was partial, is alluded to in Knud Andersen's Færöese journals. He says, writing about the annual harvest of the young ones: "September 16th, 1901. Six hundred [young Gannets] caught, mostly ready to fly, only one in partly down plumage. One of these young ones had an entirely white breast and belly, bill and feet normal. A bird like this is found every year at one spot in the breeding place (Myggenaes Stacks)."* Mr. W. E. Clarke has drawn my attention to a young Gannet of about six months with the under-parts (breast and abdomen) nearly white, in the Royal Scottish Museum; it was shot near the Bass, on September 4th, 1894, and may resemble those recorded by Andersen, being I should say, an instance of incipient albinism.†

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* I am indebted to Mr. C. B. Ticehurst for valuable extracts from Andersen's "Meddelelser om Færöernes Fugle," and from the writings of Governor H. C. Müller (1862), with translations of the above, and other passages.

† In July, 1910, a Gannet with a brown head and neck, and its beak dappled with brown, created too much sensation at the Bass Rock to be here passed over without remark. It was first seen by Mr. J. Atkinson on July 14th on the wing, and on the 31st that gentleman and Mr. Riley Fortune located its nest. It was not at all shy, and several photographs were taken of it by these observers, three of which—all slightly different—were subsequently published in "Country Life" (Sept. 3rd, 1910), "British Birds" Magazine (p. 153), "Country Life" (Dec. 24th), and "The Zoologist" (1911, p. 73). At first its brown colour was attributed to an accidental and most unusual variation from the normal plumage, but subsequent enquiry left little doubt that it had been artificially coloured with brown paint. It is however only fair to say that this is by no means the view taken of this anomalous Gannet by Mr. Fortune (*see* "The Zoologist," 1911, p. 386). The chief argument against its being a natural variety, is that there does

Colour of the Beak.—In a very young Gannet the beak is dark horn-colour, but this certainly gets paler as the bird grows older, and in an adult it is whitish, or "pale bluish-grey" as Macgillivray terms it,* with dark indented lines on

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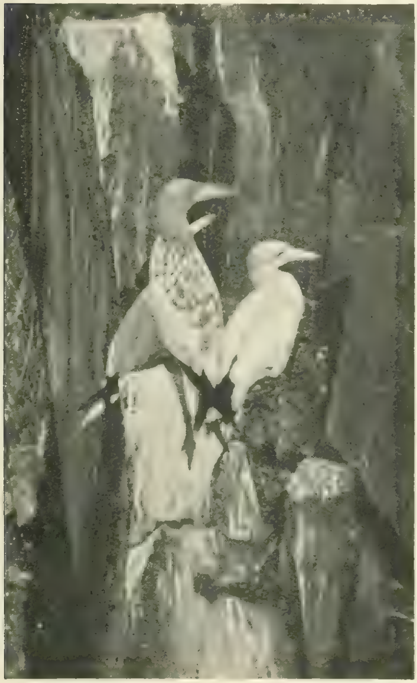
not appear to be an instance on record of any species of bird, which by nature is permanently coloured white turning by freak to a brown or black colour. Such melanism, or accessory colour, could only be brought about by a superabundance of pigment in the feathers, and in a white bird there would be no pigment, for the substance of a white feather is colourless. At any rate among the many accidental varieties of birds, variously attributable to albinism, melanism, xanthochroism, and erythrism, which have been placed on record, such a *lusus naturæ* as this brown Gannet, if it were indeed a variety, would be unknown to ornithologists at present. As this bird has given rise to a good deal of discussion, and the matter is not considered settled by some, it may be as well to give its portrait, which is reproduced from the "British Birds" Magazine (IV., p. 153), with the permission of the editors.



* "British Birds," V., p. 407.

either side. From the fork, or division of the lower mandibles, a bare dilatable skin, which is nearly black, extends downwards about 4.5 inches, sometimes more, occasionally less. The mouth, more particularly the palate and tongue, are also black, both in a young Gannet and in an adult, with a bluish tint in the former.

Colour of the Feet.—The feet are dark grey, relieved by a curious form of ornamentation—a line of apple-green commencing on the tarsus and running along the ridge of each toe. Possibly these bright lines (which are made up of oblong scales) once had some other object than that of mere ornamentation; but here we find ourselves in a field of speculation. In a young Gannet they are dark grey, but the pattern is the same—even in a nestling that much is identical. I could perceive no hue of green in these leg-lines at the age of eighteen months, but at twenty-five months it was becoming apparent.*

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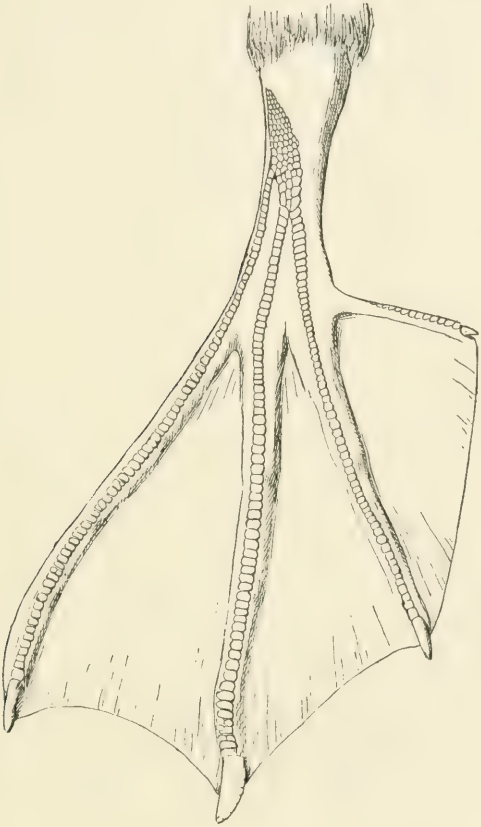
* On June 12th, 1911, I had an opportunity of seeing three adult Black-tailed Gannets, *Sula capensis*, just received by the Zoological Society, and was glad of an occasion for noting that they had just the same stripes of green upon their legs and toes as our *S. bassana* has. The pattern was also the same as far as could be seen without actually handling the birds. The tract of bare skin round their eyes was pale blue, the eye itself nearly white, lores black, beak a horny-white, perhaps a little begrimed. Some of these particulars are given in "The Fauna of South Africa" (IV., p. 18). The Australian *S. serrator* has the same stripes on its legs, according to Sir W. Buller ("Birds of New Zealand," II., p. 177).

Colour of the Eye.—I find it rather difficult to describe the nondescript colour of a young Gannet's eye. Macgillivray contents himself with saying that at five



weeks old it is "lightish." In the young Gannet I had in confinement the iris was pale grey at twelve weeks, with a slightly darker circle on the inner edge of the iris, round the pupil. At nineteen weeks its hue continued practically unchanged. At seven months this Gannet's eye might have been called purplish-grey. At twelve months there was no perceptible alteration in tint, but at twenty-four months there was some whiteness. The eye may be termed quite white when a Gannet is adult, but on close inspection there will be seen a network of minute lines within the cornea, the face or exterior of which is less convex than in some birds.

At the age of about seven months, a Gannet exhibits a ring of blue skin round the eye, which has not greatly increased in intensity at seventeen months, but ultimately it turns to a bright blue in an adult. It is probably never so brilliant in the autumn as in the spring. The strip of skin between this point and the beak, commonly called the lore, is horn-colour.

Principal Measurements.—The following measurements were taken from a fine adult :—

Length, including the beak	37.5	inches.
,, of the culmen	4.3	,,
,, ,, tarsus	2.1	,,
,, ,, middle toe ..	4.2	,,
,, ,, tail	9.8	,,
,, ,, wing from the "wrist" or carpal joint	20.0	,,
Normal expanse of wings ..	5.9	feet.

Macgillivray gives the length of four Gannets as thirty-six inches, thirty-seven inches, thirty-three inches, and thirty-five and a half inches; and of three North American examples as thirty-eight and three-quarters, thirty-eight and three-quarters, and thirty-seven (" British Birds," V., p. 420). It would thus appear that American Gannets are slightly larger than those of Europe. Mr. J. Stilfox has met with Gannets on the Coast of Ireland which were six feet ten inches in expanse, from tip to tip of wing (" The Field," September 5th, 1896), which is a foot more than two measured by me.

The Weight of a Gannet.—Birds, like human beings, vary in size and bulk, and are often heavier whilst in immature plumage than when adult. This probably arises from an excess of fat, as the bones would not get smaller, though possibly lighter, but even individuals of the same age are found to differ. An adult Gannet, lying dead on the shore, which may have wasted a little, only weighed 4 lb.; another, held up alive with its legs tied, weighed 4 lb. 4 oz.; while another, a breeding bird in good condition, turned the scale at 6 lb. 5 oz. Of course it goes without saying, that young Gannets, before their parents have begun to starve them, are a great deal heavier than old ones, owing to the mass of accumulated fat which they put on while in the nest, which is said to be sometimes three inches thick upon the breast.* A half-grown young one weighed 7 lb. 8 oz., an older juvenile 8 lb. 4 oz., whilst one which was ready to take the sea, weighed 8 lb. 12 oz.; all three were alive when weighed. As their fat melts away so do they decrease in bulk, but it takes a long time to work it all off. A young one, which could fly well enough to get as far south as Norfolk, weighed on October 23rd, 5 lb. 8 oz., having got rid of 3 lb. in about six weeks, supposing that it had left the Bass about September 11th (*see* p. 375) †

The Pterylosis or Feather-tracts.—The feather-tracts or patches in birds' plumage vary much in different families, and, there can be little doubt, have relation to the movements of the body and the wings; as they are usually well-defined areas, they are held by naturalists to be of primary importance. The first to make a serious study of this previously neglected subject was Christian Nitzsch, an original investigator, who in

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* "St. Kilda," by G. Seton, p. 181.

† In the "Field" of September 16th, 1899, there is an article on the weights of various large birds, by Mr. J. E. Harting, who also gives a good many weights in his "Handbook of British Birds" (new edition). Mr. M. Barne tells me that some of the Emperor Penguins which he assisted Captain Scott to collect in the Antarctic, weighed over 80 lb., a figure which no European bird approaches.

1833 brought out at Halle, where he was professor of zoology, a Latin essay with the title "*Pterylographia Avium Pars prior.*" From the papers which he subsequently left at his death, Burmeister (laudably desirous to complete the work which his predecessor had so well begun) elaborated a comprehensive "Pterylography." This being translated from the German by the Ray Society in 1867, has ever since been the standard work on the subject in England. In that comprehensive work, the "Dictionary of Birds," the subject of birds' feather-tracts is briefly dealt with by Professor Newton (Introduction, p. 63), and later on it is again treated of at greater length by Dr. Hans Gadow (p. 744). This latter author distinguishes ten principal tracts or areas from which the feathers of a bird arise, of which the chief ones in the *Steganopodes* are the spinal-tract, the ventral-tract and the neck-tract. All these are of considerable width in *Sula*, or *Dysporus* as Nitzsch calls the Gannets, which is the only genus of the *Steganopodes* figured, at any rate in the English edition of his work.*

Having stripped a Gannet of its plumage—a work which to my unaccustomed hands was one of no slight labour—and then rubbed off the down as far as it could be got rid of, I endeavoured to verify the feather-tracts set forth by

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* "Pterylography," Plate X., p. 150.

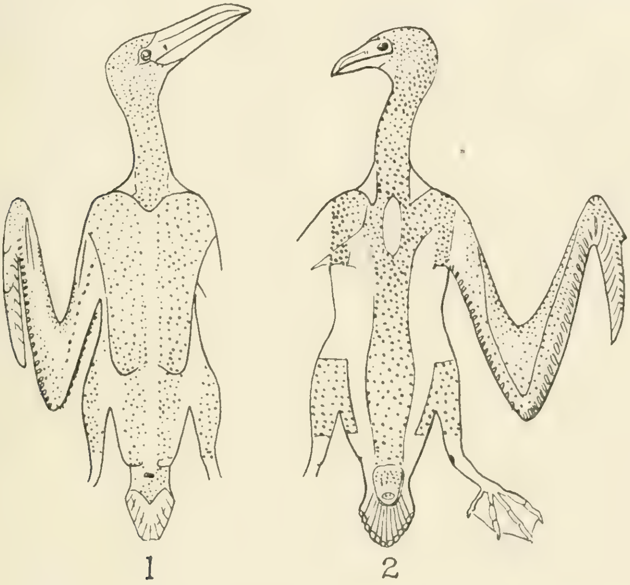
Nitzsch. Having found this impossible, I obtained another specimen, and by the advice of Mr. W. P. Pycraft cut all its feathers off very close with scissors, and then, with the help of spirit of wine, endeavoured to remove the down. This plan answered better, but the down is so dense that the best plan is really to skin the bird and trace out the feather-tracts on the interior of the skin, and not on its exterior. This being done, and the Gannet being now turned inside out, it was at once apparent that the feathers sprang from every part of the neck, and that the head also was completely clothed with small feathers. In the same way the whole of the under side of the body was covered, with the exception of a line down the middle contiguous to the keel of the breast-bone, and continuing uninterruptedly to the vent.

Nitzsch's figure gives a bare space on the upper part of the back, between the scapulars, short, rather broad, and oval in shape, to which he assigns generic value. In one of my subjects, however, this interscapulary space, which lies in the middle of the spinal tract, was very ill-defined, and not entirely devoid of feathers, so perhaps too much stress has been laid upon it by Nitzsch.

Again, Nitzsch's figures present a narrow strip of bare skin between the thighs and the sides of the belly. I am not sure if this narrow space was feathered in the first

Gannet examined, but it certainly was in the second, which was a bird about seventeen months old.

The spinal tract of feathers is very well defined in a Gannet, extending along the vertebral column to the tail. On both sides it is bordered by large featherless spaces, which reach as far as the wings, and in the other direction almost to the vent, as shown in the drawing. Both the spaces and the tracts are easily traceable from the inside of the skin.



NO. 1.—THE VENTRAL ASPECT.
NO. 2.—THE DORSAL ASPECT.

No description of the Gannet's pterylosis is likely to convey so correct an idea of it as an illustration, and accordingly Nitzsch's two figures are reproduced from a copy by Miss C. J. Gurney.

CHAPTER XXI.

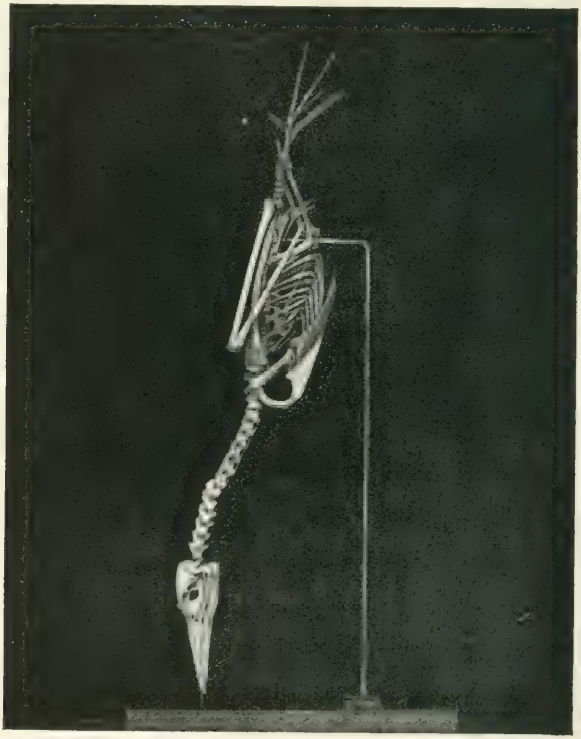
THE GANNET'S OSTEOLOGY.

Osteology of the Gannet—The Skull—Beak—The Olfactory Apparatus — Sternum — Coracoid Bones — Clavicles—Pelvis—Vertebral Column—Wings—Legs—Toes and Claws.

Osteology of the Gannet.—In the Gannet we have an ocean-bird of peculiar habits, in which structure and function answer to one another in a way which would be surprising, did we not see the same principle at work in so many branches of the animal kingdom. It is instructive to trace this correspondence out to the fullest, and thereby demonstrate the way in which each important bone is shaped in accordance with the muscles and ligaments attached thereto ; and again to see the manner in which that muscular system combines with the air-cells, the skeleton, and even the plumage, to give the Gannet the utmost facilities for the unique way in which it has to obtain a livelihood.

One very noticeable point about this heavy plunging bird is, that not only is its body a receptacle for the storage of air, but its bones also hold a considerable quantity, either free or compressed. This is especially alluded to in a long and very complete memoir on the Gannet's osteology by Dr. R. W. Shufeldt, published some twenty-four years ago in the United States.*

In that author's opinion a pneumatic state exists over almost the entire skeleton—a condition presumably provided for the same purpose as the subcutaneous air-sacs



SKELETON IN THE ATTITUDE OF PLUNGING.

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* "Osteology of *Sula Bassana*," by Dr. R. W. Shufeldt ("Proceedings of the United States National Museum," 1888, pp. 287-309).

to be described presently, viz. to lessen the force of the plunge, which, directed as it often is from a height of sixty feet, must be something tremendous.

In treating of the Gannet's osteology* it will be convenient to consider the skeleton as disarticulated, and for convenience sake to divide it into two portions—the one consisting of the cranium, the sternum and the pelvis, which are receptacles for the vital organs, and protect them from injury ; the other of supports for locomotion by either wing or leg. We can take the parts in the following order : The Skull, the Beak, the concealed Nostrils, the Sternum or breast-bone, the Coracoids, the Clavicles, the Pelvis, the Vertebral column, the chief bones of the wing, the bones of the leg, the Feet, and Claws.

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* It would be surprising if the osteology of so remarkable a bird had not attracted the attention of scientific men, among whom the first to take notice of it was Friedrich Faber, the pioneer of Icelandic ornithology, whose account of the Gannet, printed ninety years ago, has already been quoted with approval (p. 277). The seven chief writers on the subject are as follows :—

F. Faber. "Isis," 1826 (Vol. X., p. 708).

J. F. Brandt. "Mem. Ac. St. Petersburg," 1840 (Vol. V., pp. 104, 139, 181): Figures of the foot and skull.

R. Owen. "Osteological Series, contained in the Museum of The Royal College of Surgeons," 1853 (Vol. I., p. 225).

T. C. Eyton. "Osteologia Avium," 1867 (p. 220, Plate 6, L).

St. George Mivart. "On the Axial Skeleton of the Pelecanidæ": "Trans. Zoological Soc.," 1878, p. 315 : Characters of the genus *Sula*, p. 367 : Figures of the vertebræ, sternum, and pelvis.

R. W. Shufeldt. "Osteology of *Sula bassana*": "Proc. United States Nat. Mus.," 1888 (Vol. XI., p. 287): Figures of the skull, sternum, and pelvis.

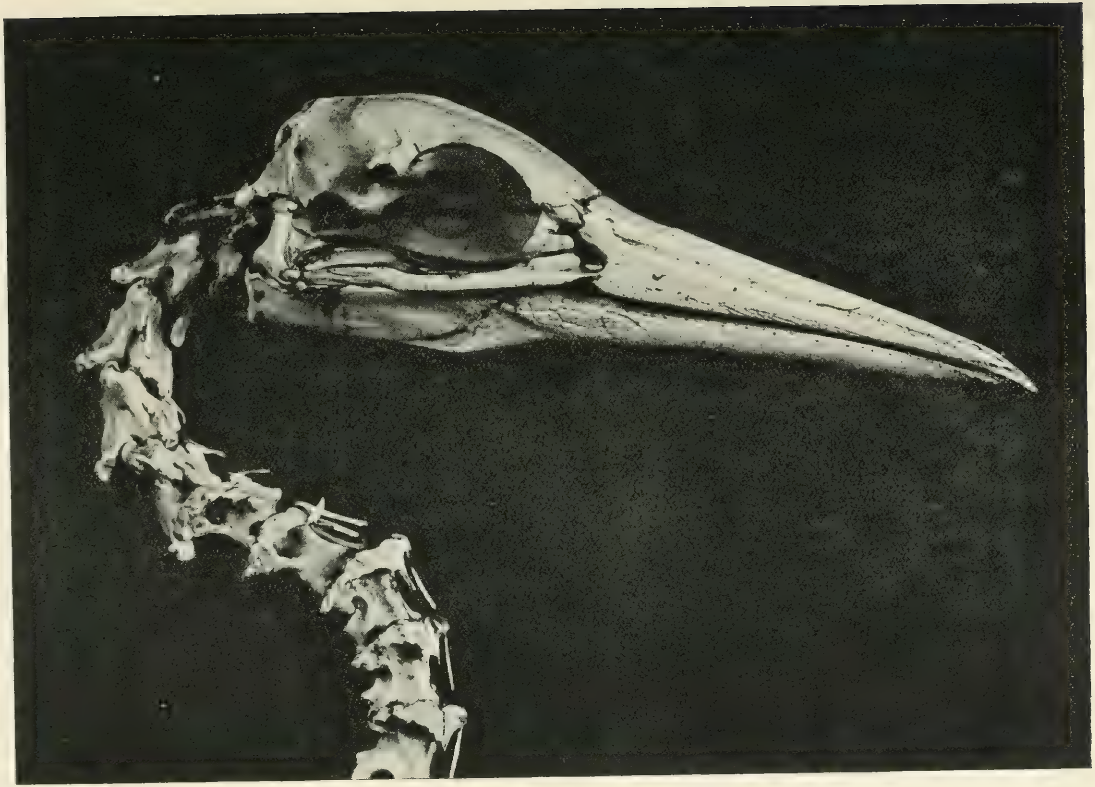
Max Fürbringer. "Untersuchungen zur Morphologie und Systematik der Vögel," 1888 (Vol. II., Staganopodes, p. 1,168, Plates of *Sula*, II., Fig. 20 ; III., Fig. 64 ; V., Fig. 59 ; VII., Fig. 26 ; XX., Fig. 1 ; XXV., Fig. 21).

R. W. Shufeldt. "Memoirs of The Carnegie Museum," 1901-4 (Vol. I., p. 132).

Reference should also be made to Mr. W. P. Pycraft's contribution to the osteology of the *Steganopodes* in the "Proceedings of The Zoological Society" (1898, p. 82). His remarks apply to all the Gannets, but the skull figured (Plate 8, Fig. 2) is that of the Brown Booby, *Sula leucogastra*.

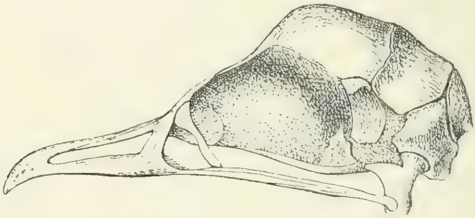
For titles of articles on the osteology and anatomy of *Phalacrocorax, see* "Catalogue of Birds in the British Museum," Vol. XXVI., p. 330.

The Skull.—The skull, as the seat of the brain, comes first. A photograph of it, which cannot but be more effective than a written description, from a skeleton presented to the Norwich Museum by my late father, may be placed in juxtaposition with a sketch of the head from which the skin has been removed to show the muscles of the neck. In this photograph the deep orbital cavity is seen, while in Mr. Wilson's sketch of the head uncovered, the same cavity is shown with the eyeball in its natural position. The size of the ear-cavity, which externally is no larger than a pin's head, is also to be remarked on in the sketch. One of its most striking features, observes Mr. W. P. Pycraft in some notes supplied for use in this chapter, is found at the point where the upper mandible joins the skull. Here will be noticed a narrow transverse groove, forming a hinge to afford free play to the beak, a useful provision for holding a fish. A Gannet's skull measures with the



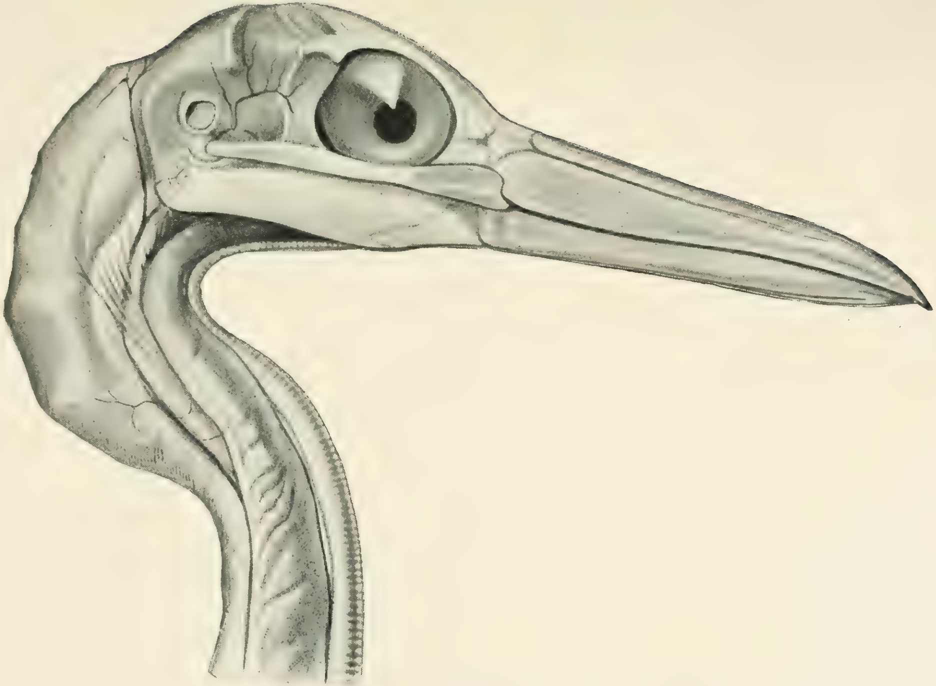
THE SKULL, AND CERVICAL VERTEBRÆ.

beak from 7 in. to 7.4 in. The walls of the skull of the adult are very dense, and show no suture, adds Mr. Pycraft, the cranium being rather flat, and the cavity which contains the brain being by no means large. Dr. Shufeldt has described it more minutely than anyone else. In the embryo and very young nestling, Mr. Pycraft informs me, the beak contains a deep fossa, which gradually fills up, but is not I observe entirely gone at seven weeks. This has been shown by Mr. H. Grönvold in the annexed drawing, which was taken from an embryo ready for hatching—received from the Bass Rock.



SKULL OF AN EMBRYO.

The Beak. The sheath of the beak is compound, and furnished with the sharpest cutting edges, very hard and slightly serrated, the serrations pointing inwards, and little chance would any fish have of escaping from them. On either side of the upper mandible, at its margin, is seen the joint, or dentation already alluded to, and no better device for grasping a Gannet's slippery prey could there be. On holding out a stick for a Gannet to seize, as I have



THE HEAD, SHOWING THE MUSCLES.

sometimes done, the working of the joint can be plainly seen. Across the lower jaw there is another hinge, probably to increase the width of the gape when feeding the young. The tip of the beak is slightly curved, and a deep groove, generally termed the nasal-groove, runs along the sheath of the upper mandible, and is continued to the end. The roof of the mouth is supplied with raised edges, another provision for holding a fish when caught.

The Olfactory Apparatus.—The Gannet has no external nostrils, although the position where they might be expected is indicated; the exact spot lies at the posterior end of a deeply indented furrow, on the sides of the upper jaw, or mandible, which in a nestling Gannet is very pronounced. But although there are no nostrils, the olfactory chamber is nevertheless fairly well developed,* but it is improbable that the power of smell is much developed (*cf.* p. 384). Certainly it does not equal that of the Petrels.

The Sternum.—The sternum or breast-bone, which supports the coracoid bones, is a very important part of a bird's skeleton, and it would be interesting to see what modifications of it exist in the embryo Gannet, whilst still in a state of cartilage. It has been fully described by Dr. Shufeldt, who remarks on its unique form (*t.c.*, p. 297); it is, however, not so dissimilar from that of the Cormorant as might be expected. A Gannet's sternum is of considerable length and very strong, the posterior portion forming a complete and admirable shield to the abdominal parts of the body. Yet this shield exists, but in a less degree, in the Cormorant, which does not plunge.

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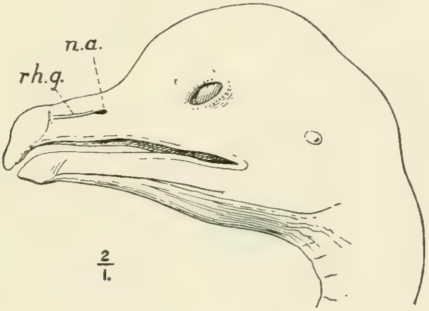
* *See* Dr. Hans Gadow in Bronn's "Thier-reichs" (VI., p. 452). In the Cormorant, Mr. F. A. Lucas finds the nares open for four or five weeks after birth, but is of opinion that they close when the young ones take to the water (*cf.* "The Auk," 1897, pp. 87, 205). Their position in the young of this species has been shown by Mr. W. P. Pycraft, in an article in the Linnean Society's "Journal" ("Zool.," XXVII., p. 207), from which the annexed drawing is borrowed with permission.

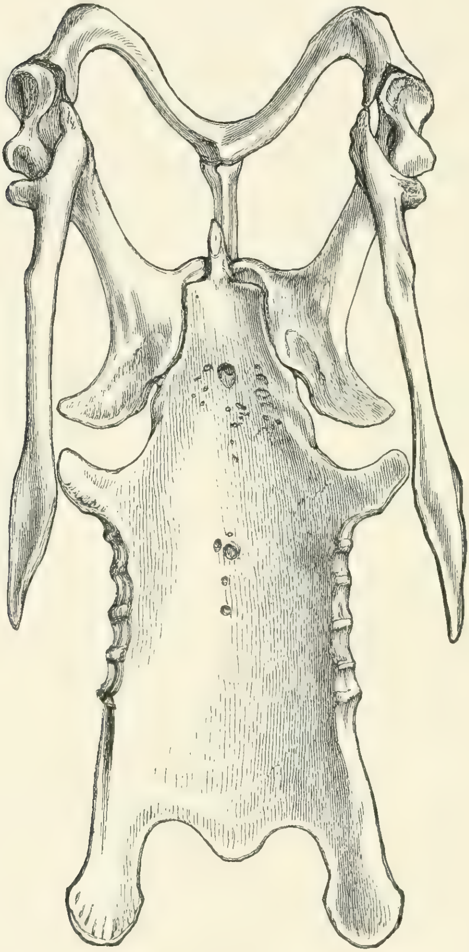


N.A.—NARIAL APERTURE LYING WITHIN THE RHINOTHECAL GROOVE.

RH. G.—RHINOTHECAL GROOVE.

As remarked by Mr. Pycraft, the carina or median ridge, generally called the keel, affords in most species an indication of the bird's volant powers, for to the sides of the keel, and to the body of the sternum, are attached the muscles which raise and depress the wings.

A Gannet's furculum has the appearance of being fused with the sternum, which is a further protection against the shock of contact with the sea. But it is not, as a matter of fact, so ossified. In the notes with which he has favoured me, Mr. Pycraft better describes the union of the bones, by saying that the furcula articulates by a glenoid surface* with the carina sterna.†



THE STERNUM (AFTER DRESSER).

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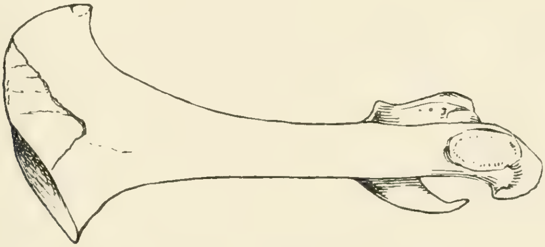
* "Glenoid surface" or cavity. Mr. Pycraft applies this term to any articulating surface which is very shallow and faced with cartilage, permitting of movement without friction.

† In the Frigate-bird, observes Mr. Pycraft, the furculum is completely fused with the coracoid bones on the one hand, and the keel of the sternum on the other. In the Pelican the articulation with the sternum has become locked by fusion.

Mr. Pycraft holds that the keel of a Gannet's breastbone makes up for its deficiency in depth by its growth forwards, which, it will be noticed, takes it quite beyond the anterior lateral processes, so that the carina projects far beyond the bases of the coracoids.

In front, and on either side, as may be seen from the cut,* the sternum of a Gannet exhibits a large, prominent wedge, affording attachment for the supra-coracoidous muscle.



LEFT CORACOID (AFTER SHUFELDT).

The Coracoids.—The coracoid bones, so called from some supposed likeness between the upper border of the " neck " of the human shoulder-blade and a Raven's beak, form, with the scapula, the point of attachment for the wing, and are held to be among the most characteristic bones of the ornithic skeleton (" Dictionary of Birds," pp. 104, 856). Besides being of unusual power, in the Gannet they are set on very obliquely. From the Coracoids we pass to

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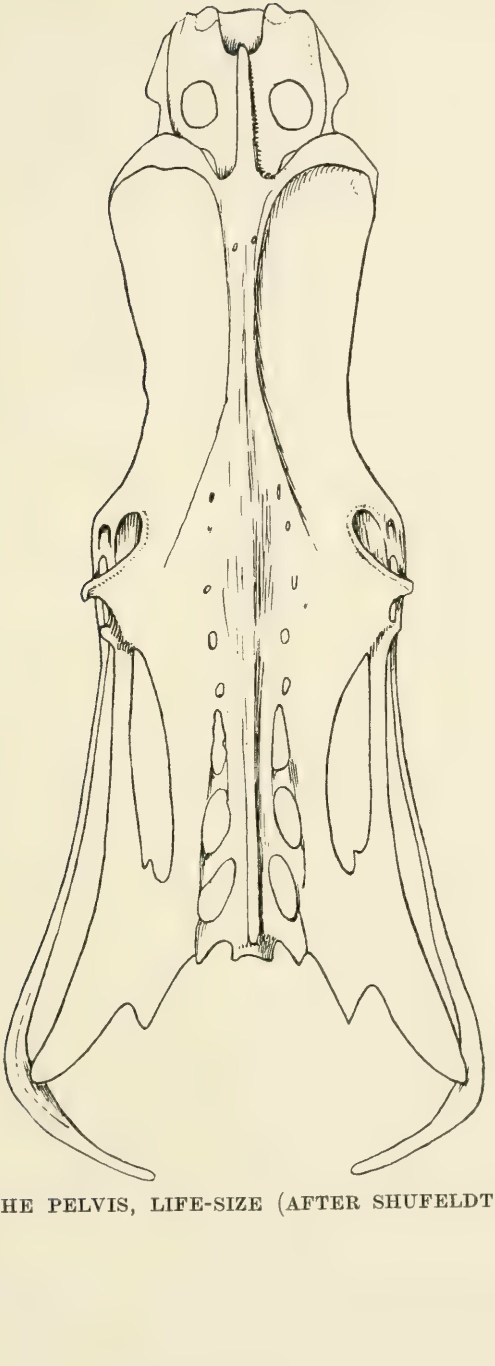
* Copied by permission from Dresser's " Birds of Europe " ; an external view of the same bone is given on page 398.

The Clavicles.—The junction of the clavicles or furcula with the sternum, intended to lessen impact with the sea, was first detected by Robert Gordon (*see* p. 213), I believe, but it has often attracted notice. The clavicles of the Gannet are wide, being 2-3 inches across, forming a broad and strong U-shaped arch which, as remarked by Mr. Pycraft, "articulates by a broad facet with the anterior end of the carina, while their free ends display large flattened facets for articulation with the coracoids, a feature well marked in the *steganopodes* and accipitres."

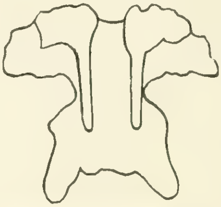
The Pelvis.—The pelvis is six inches in length, and consists partly of fused vertebræ, but figures of the exact size, from above, below, and also taken laterally, are given by both Professor Mivart and Dr. Shufeldt in their Memoirs. One of the latter's excellent cuts is here reproduced. Mr. Pycraft observes that the pelvis presents much in common with that of the Cormorant and Darter, and differs conspicuously from the Tropic-bird and Frigate-bird, in part on account of the greater length in proportion to its breadth, in part in that the anterior portion of the ilium meets its fellow in the middle line above the vertebræ.

The Vertebræ.—The vertebral column which has in all birds the support of the head and limbs, and the protection of the spinal cord for its functions, is in the Gannet of immense strength, and with the pelvis measures 22.2



THE PELVIS, LIFE-SIZE (AFTER SHUFELDT).

inches. It is fully described by Professor Mivart ("Trans. Zoological Society," 1878, pp. 336-341). The neck-joint or flexure is at the junction of the seventh and eighth vertebræ, and the difference in the angles of articulation above and below it, is marked. I find twenty-six free vertebræ in all,* viz. seven caudal, six cervico-dorsal, and thirteen cervical—the same in two skeletons—to which Professor Mivart adds fifteen more vertebræ anchylosed in the pelvis, which are less easy of counting.



The transverse spinous processes on the front of the cervical vertebræ are long, and five in number, diminishing from 1.4 inch, which is the length of the biggest pair (*see* drawing of the ninth vertebra, after Professor Mivart).

The Bones of the Wing.—Flight is the most striking attribute of the generality of birds, and of the Gannet in particular. Accordingly the Gannet's wing measurements are very large, as may be judged from Mr. J. C. Adams's photograph on p. 413, and the humerus correspondingly powerful. I make its wing measurements to be :—

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* This agrees with the total number given by Dr. Gadow, who divides them into seventeen cervical, one cervico-dorsal, three dorsal, four or five thoracic; but it does not agree with Mr. Pycraft's counting (*see* "Proc. Zool. Soc.," 1898, p. 99). Mr. Pycraft makes thirty-one free vertebræ. Dr. Gadow gives a table showing the numerical diversity in thirty groups of birds, of which the highest is the Swan ("Dictionary of Birds," p. 849).

Humerus, slightly curved ..	8.6 inches.
Ulna and radius	7.8 ,,
Metacarpal bones	3.5 ,,
First phalanx	1.7 ,,
Second ,, ...	1.8 ,,
Third ,, ...	1.4 ,,

A metacarpal bone figured by Dr. Shufeldt was rather larger than the above.

The Bones of the Leg.—The Gannet is stated by Dr. Shufeldt to be one of those birds in which the small bone attached to the tibia, and known as the *fibula*, is complete.* The tibia is four inches in length, the femur, or thigh-bone, is 2.8 in. and 1.3 in. in circumference. Compared to these the tarsus is short; otherwise the bones of the leg call for no special remark.

The Feet.—The variety of structure in birds' feet is as extraordinary as the diversity of any part of the body; yet evolutionists must believe that all birds sprang from a common ancestor.

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* "Ibis," 1894, p. 361. In *Pelecanus* and *Phaëthon* it is not so.

Save in the relative lengths of the toes, Mr. Pycraft does not consider the skeleton of a Gannet's foot to present any very remarkable characters, but he has obliged me with the following remarks: "One cannot help being puzzled as to the significance of the all-embracing web which binds the toes one to another even including the hallux. This is one of those cases known among evolutionists as 'hypertely'—where modification of structure seems to have gone beyond the requirements. The Cormorant and the Darter, one might have supposed, would derive benefit from this comprehensive webbing; but if it really conferred any special benefit one would expect to find the same modification in the case, at least, of the Diving Ducks, Divers and Grebes, and Diving Petrels for example. Yet in these it is wanting; and further, it must not be forgotten that the Water-hen is an expert swimmer and diver, yet possesses no interdigital webs at all!"

All four toes in the Gannet are united in a single web, as shown in the cut (p. 491), yet only three of them project forwards, for the first toe, which corresponds to the hallux and consists of two phalanges, has a sideways direction. This led Beddard and Finn to suppose that the original form of the foot in the *Steganopodes* was as it is now in the *Passeres* (*see* "Structure and Classification of Birds," p. 4); but whether the palmate foot or the grasping foot be the more primitive, there is hardly enough evidence to show. Mr. Pycraft, whose studies of the *Archœopteryx* have led him to regard birds as descended from an arboreal stock, thinks it was the latter. The second toe has three phalanges, the third four, and the fourth five. This union of the toes in one web, which is visible in the embryo long before it is hatched, is a character which the three species of Gannets, and their close allies the Boobies, have in common with the Pelicans, Cormorants, Darters, and Tropic-birds, but only partially with the Frigate-bird, which has a smaller web. It cannot be said that these genera have very much in common. With the exception of the Pelicans and Gannets, they perch upon trees and even breed upon them, for which their webbed feet seem to be but ill adapted. The reason for a junction, therefore, of the four toes remains unexplained, unless we adopt the hypothesis that it is an obsolete character, inherited in the remote past; but even then its function remains unsolved.

The Claws.—Gannets' claws are stout sheaths, curved and obtusely pointed. The third claw inclines outwards and is probably a little prehensile. Its inside rim is pectinated, but not always to the extremity, the pectinations generally dividing it into eight teeth; in Gannets of the year, however, and even up to the age of sixteen months, this pectination either does not exist, or is very difficult to discern. Occasionally a second line of pectinations may be detected, but then they are smaller, and it may be they drop off, like the extremities of the claws in Willow-Grouse. If these teeth have any function at the present day it cannot be that of a comb, because they are too close to one another to serve such a purpose.*

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* The Australian Gannet, *Sula serrator*, and the African *S. capensis* have just the same pectinations of the claw as *S. bassana*, while in the Boobies the pectinations are even more pronounced. They are very obvious in the Cormorant and Shag, but rudimentary in the Pelican, and non-existent in the Tropic-birds and Frigate-bird. These curious serrations exist in various birds, reaching their fullest development in the Nightjar and the Bittern. Many plausible suggestions have been made as to their proper functions, but none of them satisfactory, and the only alternative conclusion which remains is that their use, whatever it was, passed away in the ancestral times, and has now become as obscure to us as the *Archæopteryx's* tail !

CHAPTER XII.

THE GANNET'S ANATOMY.

The Value of Anatomy to Systematists—The Gannet's Air Cells—The Cellular Tissue next the Skin—The Œsophagus—Trachea and Syrinx—Tongue—Eye—Brain—Ear—Oil-gland.

The Value of Anatomy to Systematists.—In a monograph of a single genus of birds, and still less of one species, no writer can afford to neglect anatomy,* and that for several reasons, of which not the least is that by observing the organic structure of his subject, he will best know where that bird's proper place is in any proposed arrangement. Thus a Gannet's feet at once lead us to place it among the *Steganopodes*. The members of this order may be diagnosed by one external character alone, viz. their feet, which are totipalmate—that is, all the toes, including the hallux, are united by a web.

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* It was a Scotchman, William Macgillivray, at that time little known to fame, who first in Great Britain (1837) propounded a scheme for the classification of birds by anatomy. Hitherto his countrymen had been for the most part content with the system of the celebrated Linnæus, which divided all birds into six orders, chiefly in accordance with the form of the bill and feet. The modifications of the mouth, throat, œsophagus, proventriculus, stomach, and intestines seemed to Macgillivray to throw more light upon the affinities of the larger groups of birds than any external organs, which by themselves form an artificial arrangement; and here the Scotch naturalist showed himself ahead of his time. In the preface to his "History of British Birds" this is clearly stated: "After much consideration," he says, "and after examining the digestive organs in a great number of birds, belonging to nearly all the families, I have resolved to adopt the intestinal canal as a central point of reference" (*t.c.*, Vol. I.); and he does this in his work, in the thorough way which was his custom.

It cannot be said that anything like a complete anatomy of the Gannet has yet been published, and even now to do justice to half its details would require far more knowledge than lies at my disposal at the present time. Nevertheless there are a good many important contributions to be found scattered in the writings of Montagu (1811), Nitzsch (1825-40), Owen (1830), Macgillivray (1852), Garrod (1873-6), Max Fürbringer (1888-91), Maynard (1889), Gadow, and F. E. Beddard, on which I have drawn considerably for information, and which will be invaluable to whoever hereafter takes up the task fully. Let us first consider the air-sacs, which are exceedingly curious.

The Air-sacs or Cells of Gannets.—Air-sacs are a very curious part of a bird's body, or rather they are the vacuities without which a bird's body would not be complete. In few species are they so developed as in the Gannet, and in fewer still do they envelop the body beneath the skin, as in that species. In addition there are certain internal cells, which are all that many birds have. Learned brains have given time and thought to the air-sacs of birds, but possibly no one has devoted so much attention to these singular reservoirs as Mr. Bruno Müller, whose conclusions as given in the "Smithsonian Miscellaneous Collections" (1908, Vol. IV., p. 365) are the results of long and patient investigations.

In Germany, also, a very elaborate study of birds' air-sacs has been undertaken by H. Strasser and other anatomists, while England has not been behindhand, so competent an authority as Dr. H. Gadow having handled the subject in the "Dictionary of Birds" (1893-6, p. 3) in his usual precise manner. Much information is also given in the "Proceedings of The Zoological Society" (1830, p. 90; 1882, p. 560; 1883, p. 141; 1884, p. 543; 1886, pp. 145, 178), as well as in Pycraft's "History of Birds" (1910).

Reference may also be made to Mr. Pycraft's description and figure of the Cassowary's air-sacs in "The Transactions of The Zoological Society" (1901, p. 252 and Plate XIV.).

Dr. Gadow's description of what air-sacs are, will be the best preface for any remarks which I am able to offer:—

"Air-sacks (or sacs) are membranaceous receptacles which communicate with the cavities of the respiratory organs or passages, and can through them be filled with air."

Dr. Gadow points out that it is necessary, according to their connections, to distinguish between pulmonary air-sacs, of which there are ordinarily five pairs, and which make their appearance in a bird before it is hatched, and the naso-pharyngeal air-sacs which are restricted to the head, occasionally extending to form a pouch. "The outside of the sacs," he continues, "frequently possesses a covering of involuntary or of voluntary muscles; for instance, in Vultures, Gannets, and Flamingos a thin fan-shaped muscle extends from the furcula over the interclavicular air-sac. Through contraction of these muscles the cells can be emptied of air."

In the Gannet we are more particularly concerned with the subcutaneous air-sacs, although no structural difference exists between them and the internal air-sacs, both being alike, connected with, and supplied from, the lungs. There are several genera of birds in the world besides Gannets which have subcutaneous air-sacs, while all species, even those which have become flightless, remarks Mr. Pycraft, have internal ones.

With regard to such birds as the Stork, the Flamingo, the Adjutant, the Hornbill, the Crested Screamer,* the Bustard, the Emu, and the Pelican,* there have been various speculations as to what the air-sacs or cells are for, the truth probably being that in different birds they serve different ends. Probably in none of the above-mentioned species are the functions of the air-sacs the same as in the Gannet; but of this more presently.

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* An example of the Screamer, *Chauna chavaria*, which died in the Gardens of the Zoological Society, gave an opportunity for a good description of the air-sacs by Mr. Beddard ("Proc. Zool. Soc.," 1886, p. 178). This bird has the power of soaring at great altitudes where the density of the atmosphere would be much less than on the earth's surface.

In the Gannet the subcutaneous air-cells are those which first, and more especially, attract our attention. It is a little singular that the curiosity of no scientific man had been excited about them before the time of Francis Willughby. It was Willughby, who may be styled the father of British Ornithology, who detected the air-cells of the Gannet, and he probably thought them unique in bird-anatomy; nor was he far wrong. It is true that the enquiring mind of William Harvey, Charles the First's physician, was drawn to investigate the air-sacs in some birds, but not the subcutaneous cells of the Gannet. It was Willughby who, after dissecting one picked up in Warwickshire, wrote . "Cutis laxe admodum carni adhæret,"† and it was Montagu who, in 1811, first described these air-cells fully, though he did not quite realize their meaning.

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* In two examples of *Pelecanus onocrotalus* which I examined in Egypt in 1875, the air-sacs were very much in evidence, forming a thick mass of loose subcutaneous tissue, which not only covered the whole of the body, but even reached to the wings.

† *See* "Ornithologia," p. 247. Harvey excepted, the first exponent of birds' air-sacs in England was John Hunter (*see* "Philosophical Trans.,"

Not the least remarkable fact connected with the air-cells of the Gannet is the presence in them of a Mite or Acarid, but of this more hereafter.

To describe a Gannet's subcutaneous air cavities correctly, appears to be a very difficult task. Even so great an anatomist as Nitzsch found it hard, and a plan which I tried to make of the cells had to be given up as hopeless.* One vacuity is five inches in length, according to Professor Macgillivray, and another five inches and a half, while a third of large size is stated by him to cover

1774). An alphabetical list of many treatises is given by Mr. Müller, but here it is only necessary to mention those which refer to the Gannet :—

G. Montagu, "Memoirs of The Wernerian Nat. Hist. Soc." (1811), pp. 176-190.

G. Montagu, "Ornithological Dictionary," Supplement.

R. Owen, "Proc. Zoological Society" (1830-1), p. 90.

W. Macgillivray, "Audubon's Ornithological Biography," IV., p. 237.

W. Macgillivray, "British Birds" (1852), V., p. 419.
(In part reprinted from Audubon.)

C. L. Nitzsch, "Pterylography" (1840), English Translation, p. 150.

H. Boulart, "Journal d'Anatomie et Physiologie" (1882), XVIII., p. 467.

Mlle. F. Bignon, "Comptes Rendus de la Société de Biologie," Paris (1889), p. 90.

E. Deslongchamps, "Mem. Soc. Normandie," Ser. 2, Vol. VIII.

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* *Experiments to inflate the Cells with Gelatine.*—With the assistance of the late Professor Newton an attempt was made at Cambridge to secure an impression of some of the air-cells in a pair of Gannets (sent from the Bass Rock), by the injection of plaster-of-paris and gelatine. It however proved a task of greater delicacy than had been expected, the smaller tissues at once giving way under pressure,

the abdomen (*see* "British Birds," IV., p. 419). Mr. C. B. Ticehurst has supplied the following note on a dissection made at Lowestoft, October 10th, 1911: "Adult. Patellæ osseous, tendons of wings and legs not so. Extensive subcutaneous air-sacs extending from clavicle down over breast and abdomen to pubes and round to sides; also sacs under sternum and between the pectoral muscles, and between these muscles and the sternum. These sacs communicate with the lungs through channels where the bronchi break up (on each side) into a honey-comb tissue; entrance (from within) to the large subcutaneous air-sacs is just outside the coracoid and close to the tendon of the pectoralis minor, between that tendon and the nerves and vessels which supply the pectorals. The pectoralis

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so that the attempt was a complete failure. But the same thing had already been tried at Paris by Mlle. F. Bignon, with a considerable measure of success, as appears from the results which she communicated to the "Société de Biologie" ("Comptes Rend. de la Soc. de Biol.," 1889, p. 90). Therein she fully confirms the opinion, already advanced by another anatomist, M. Boulart ("Journ. d'Anatomie et de Phys.," XVIII., p. 467), as to the complete separation of the cervicocephalic sacs. But the investigator who has advanced the furthest, although his attention was not directed to the Gannet, has been Mr. Bruno Müller. He experimented entirely on Pigeons, and tells us that he made use of paraffin and gelatine (10 per cent. coloured with Berlin blue or carmine). He first placed the bird in formol, and for some days injected formol with gentle pressure through a canula into the trachea, and thence into the air-sacs, which became hardened in a moderately distended condition ("Smithsonian M.C.," IV., p. 365).

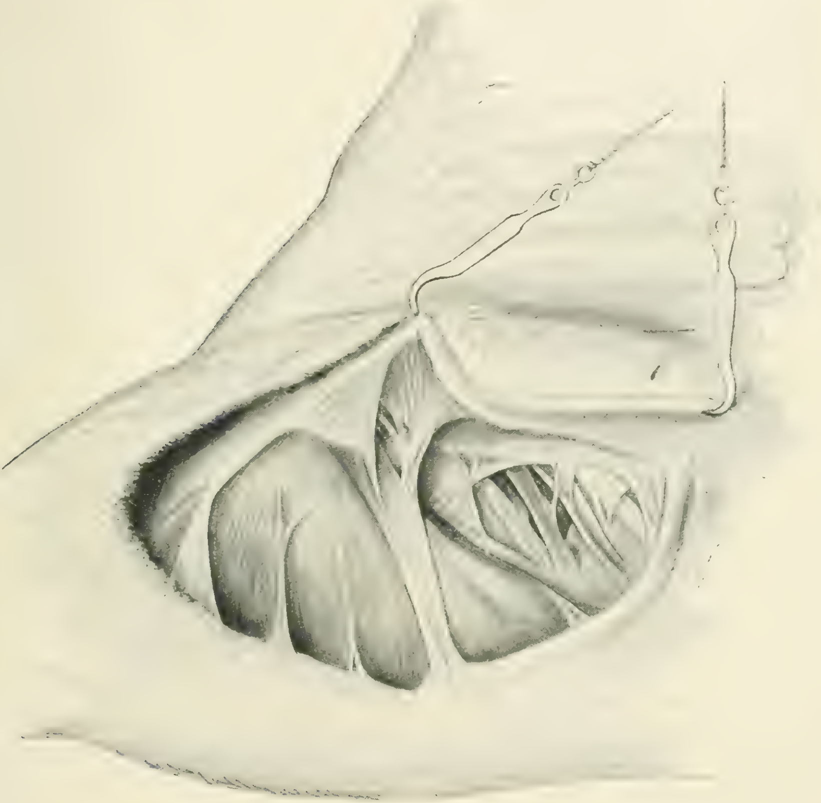
minor is small (as also in Cormorants and Shags) for the size of the bird and occupies only one-quarter of the sternum."

It is plain that the cells are not small, and that most of them communicate with one another by a passage of more or less size. It can be said in general terms that the cells almost envelop the breast, belly, and sides, but there are none on a Gannet's back, and this is another reason for thinking that their function is to break the force of the plunge.

Some of the systa are nearly two inches in length, without undue stretching, and are so firmly united to the pectoral muscles that a knife is needed to part them.

Down the centre of a Gannet's breast, and attached with considerable tenacity to the keel of the sternum, there lies a stout, tightly-drawn membrane, which forms a firm wall of division between the cells on either side of the under-part of the body. Yet this membrane may be perforated somewhere, for Professor Owen found on using a pipe, that air could pass from one side of a Gannet's body to the other (*see* "Proc. Zoological Soc.," 1830-1, p. 91), but the passage was very possibly internal.

Mr. Wilson's drawings, excellent as they are, cover too small a space to give an adequate idea of what the cells are like. I regret that it is not possible to show perfectly the character of these singular and extensive air-cells in the Gannet, but they are not easy of delineation, except in small parts.



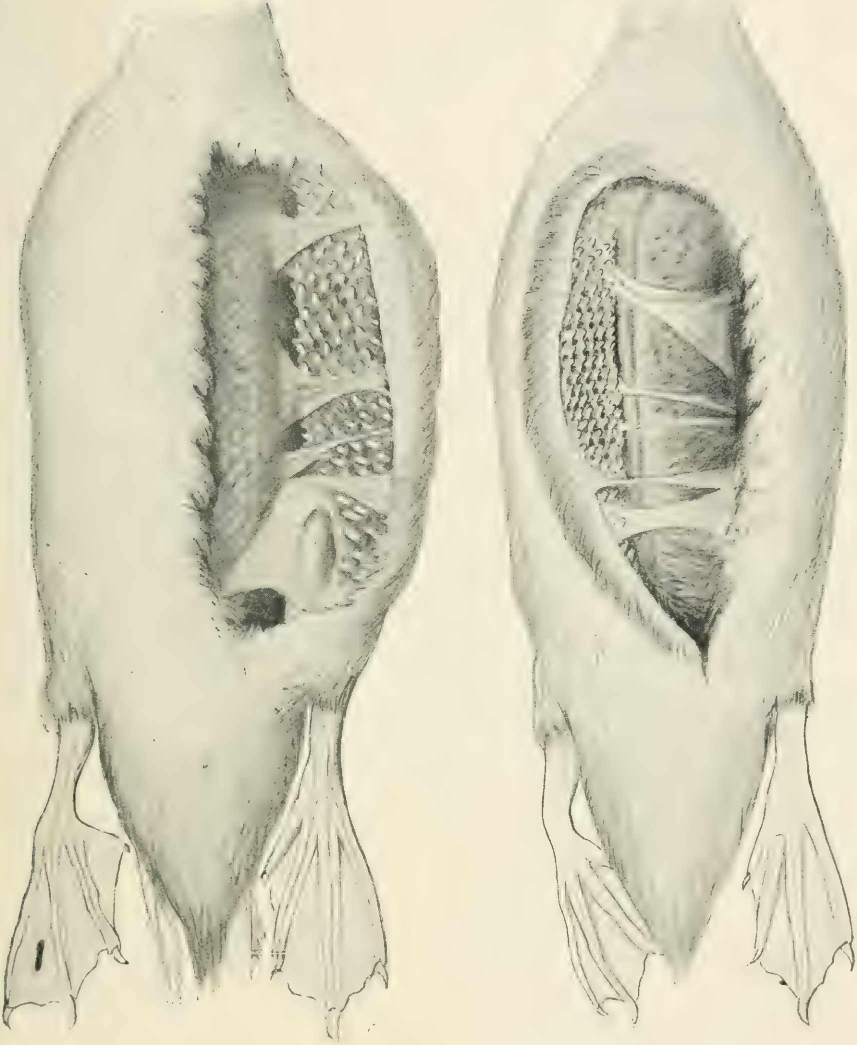
GANNET'S SUBCUTANEOUS AIR-CAVITIES.

That the air-sacs which envelop the body are emptied by muscular contraction, and filled again by inhaling air when on the wing, is admitted, but a Gannet when standing evidently has little or no power of inflation.

The subcutaneous air-sacs develop very early. They are present in a Gannet when only three weeks old, and at the age of four months they are very large.

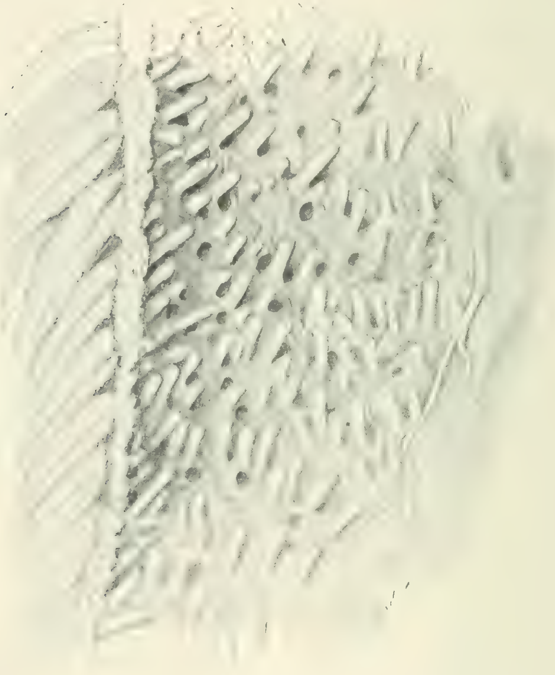
Function of the Air-sacs.—Unquestionably this net-work of inflatable cells under the skin helps to break the force of the heavy plunge with which a Gannet drops into the water, and it is reasonable to think that this is the primary object for which the cells are intended. This is the view taken by Macgillivray and also by Mr. F. A. Lucas ("Natural Science," 1894, p. 36), yet it may be they serve other purposes as well. There must be a large amount of space between a Gannet's skin and its body, when filled out with air for plunging. As it penetrates the water, the skin is drawn in and the air expelled through the lungs, probably leaving the cells empty.

But we have not yet finished with the air-receptacles of this bird. Between the posterior portion of the pectoral muscles and the ribs there is a large cavity, and another between the anterior portion and the sternum itself, extending to the humerus. These internal cavities must be capable of holding nearly as great an amount of air as those cells which lie immediately under the skin.



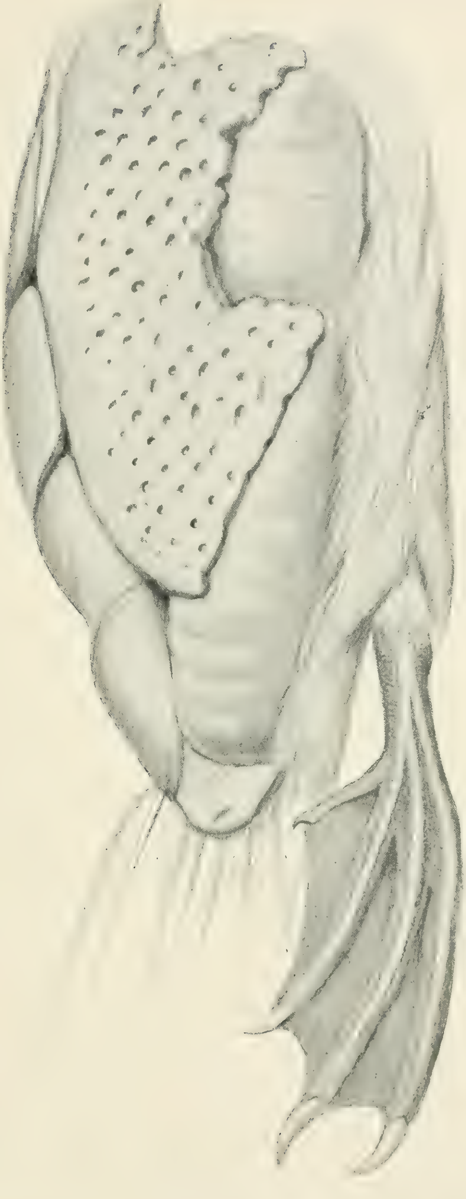
GANNET'S SUBCUTANEOUS AIR-CAVITIES.

The Cellular Tissue next the Skin.—Another point to be remarked on in the Gannet, is the cellular tissue next the skin, stretched between the tips of the roots of the feathers.



CELLULAR TISSUE UNDER THE SKIN.

On the Gannet's under-parts these roots project inwards through the skin and through the above-mentioned transparent tissue, to the extent of nearly a quarter of



PITS MADE BY THE ROOTS OF THE FEATHERS IN PLASTER-OF-PARIS.

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an inch. Here, being interlaced one with another, they constitute a pneumatic coat of no small elasticity. Apart from the air-cells proper, the Gannet must find this extra protection of immense value, when plunging for its prey. Close to the roots of each of these contour feathers, according to Nitzsch, and on the anterior side, there is a small round aperture, and these apertures I conclude form a passage to the larger cells, through which air can pass.* They are well shown in Mr. Wilson's drawing. In his second sketch the regularity of the roots of the feathers is exhibited in a casting of plaster-of-paris, resting upon the lobes of the liver.

The Œsophagus.—Having now finished with the air-sacs and cellular cavities, the next most important feature in a Gannet's anatomy is the gullet or œsophagus, an organ justly regarded by Professor Macgillivray as of primary value in all birds. In the Gannet it is eleven inches in length, and exceedingly dilatable, of which I have had many proofs in my live birds. Macgillivray furnished Audubon's "Ornithological Biography" with an accurate drawing* of the œsophagus, and proventriculus, which Mr. E. Wilson has copied, as it cannot be improved upon.

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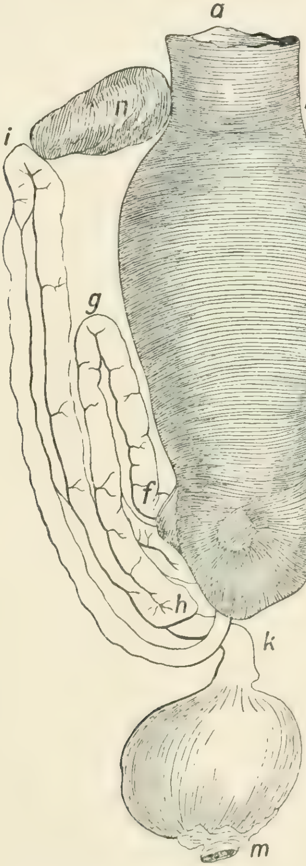
* Mr. C. B. Ticehurst writes (*in litt.*) : "I am not sure that this is so, each hole seems to enter into a small space, which is walled in by cellular tissue from the adjoining space ; the communication between each compartment (if there is one) must be small, as I cannot get any fluid to flow from one compartment to the next."



a, *b*, Œsophagus; *c*, *d*, Proventriculus; *e*, Stomach; *f*, *g*, *h*, *i*, Intestines; *k*, Rectum; *m*, Cloaca; *n*, Gall-bladder.

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* *t.c.*, IV., p. 239.

In his description Professor Macgillivray says: "It [the œsophagus] is extremely wide, nearly uniform in diameter, dilatable to four inches, but when moderately inflated about two inches wide, and half an inch less at its entrance into the thorax. Its inner coat is smooth and even, but when contracted forms strong longitudinal plaits. The proventriculus two and a half inches in width, but dilatable to four and a half; its glandules oblong—cylindrical, three-twelfths long, disposed in two roundish masses, separated by one interval of about five-twelfths. The stomach is, comparatively very small, being only an inch and three-fourths in length, and nearly of the same breadth; its muscular coat very thin, with two small roundish tendons, about three-twelfths in diameter. The mucous coat is very soft and smooth, with several large gastric crypts."*

The Intestines.—As regards the intestines which, with the œsophagus and stomach, complete a bird's alimentary system, and sometimes show considerable variation, Mr. F. E. Beddard† gives a useful table of comparative

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* Another description of the Gannet's stomach by Mr. C. J. Maynard, is in "Contributions to Science" (Newtonville), 1889, p. 151.

† "Structure and Classification of Birds," p. 403; it will be sufficient to quote four of the species named by him.

	Small intestine.	Large intestine.	Cæcum.
Phalacrocorax carbo	111 inches.	4 inches	.2 inches
Sula bassana	57 ,,	2 ,,	.25 ,,
Pelecanus onocrotalus ..	93 ,,	3 ,,	1.75 ,,
Plotus unhinga	54 ,,	6 ,,	

measurements, showing in what relation the Gannet's intestines stand to those of ten other birds. Dr. Chalmers Mitchell[*] has shown that considerable importance is to be attached to the character of the intestinal convolutions, and that, in this matter, the Gannet agrees more nearly with *Phaëthon* than with the Cormorant, or indeed any other Steganopod. Dr. Mitchell gives a figure of the intestinal tract of *Sula bassana*, and another of *Phalacrocorax carbo* in his treatise. The cæca measure ·2 inch in the Gannet.

The cæca in birds have been held to be of great importance, in fact, there are some naturalists who would divide the class *Aves* into those species which have cæca, and those which do not possess them.

The shortness of these blind-sacs in the Gannet, as compared with some birds—the Pelican, for example—which is somewhat remarkable, was noticed long ago.[†]

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[*] On the Intestinal Tract of Birds, with Remarks on the Valuation and Nomenclature of Zoological Characters. ("Trans. Linn. Soc.," 1901, Vol VIII., 2nd Series, p. 190.)

[†] *Intestinal Worms.*—In the supplement to his "Compendium der Helminthologie" (1889, p. 56), Otto von Linstow gives the following *Tænioid cestodes*, or intestinal worms, as having been found in the Gannet :—

Ascaris sp. ?
Monostomum semifuscum, Olsson.
Hemistomum spataceum, Dies:
Holostomum erraticum, Dujardin
Bothriocephalus fissiceps, Crepl.
Tetrabothrium sp. ?

The above species are confirmed by Mr. A. E. Shipley, who adds (*in litt.*) *Ascaris spiculigera*, Rud. (Schneider, "Monogr. d. Nematod," 1866 p. 45, tab. I., fig. 14).

The Trachea and Syrinx.—The trachea or windpipe is divided at its orifice into two apertures, oblong and transverse, which extend to about .2 inch. It is 8.7 in length, and about the same circumference throughout. I have counted about a hundred rings in one Gannet, and a hundred and twenty-eight in another. At the lower extremity there are two small glands, the size of a pea, which were first noticed by Montagu. Professor Garrod shows them in his figure of the windpipe, just above the bifurcation of the bronchi,* and they are again accurately figured by Mr. C. J. Maynard, who considers them to be shrunken thymus glands.†

The syrinx,—a structure peculiar to birds,—or lower larynx, situated at the bifurcation of the bronchi (considered by all anatomists to be the voice-organ in birds, in which the tongue probably plays no part), is but little developed in the Gannet, in spite of its hoarse cries of "Varroch, Varroch, Kirra, Cree, Cree." The Gannet's syrinx has been figured by the late Professor Garrod in the "Proceedings of The Zoological Society" (1876, Pl. XXVIII.), and some comparisons drawn between its structure and that of *Plotus anhinga.*

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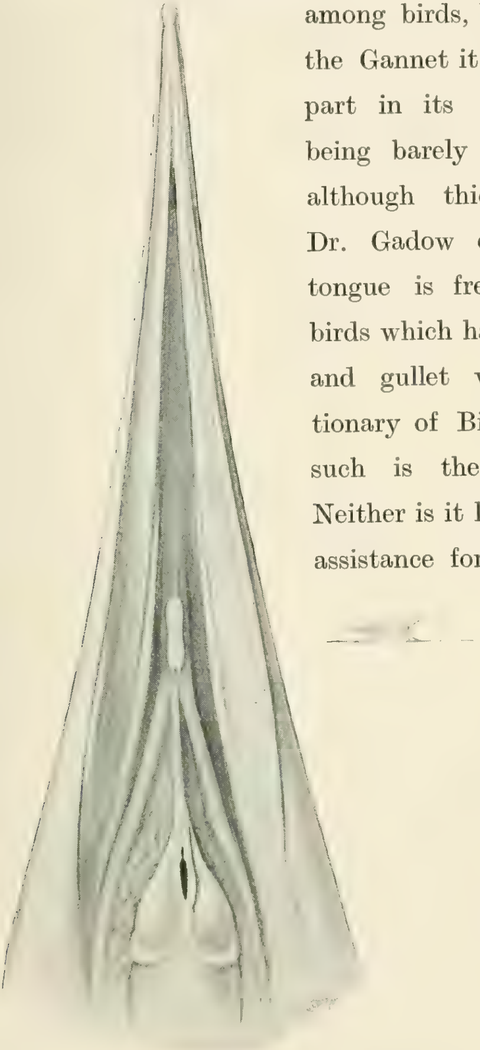
* "Scientific Papers of the Late Alfred Henry Garrod," 1881, p. 335, Pl. XX.

† "Contributions to Science," by C. J. Maynard, 1889, p. 116.

The Tongue.—The tongue presents endless modifications among birds, but in the case of the Gannet it can play but little part in its owner's economy, being barely .4 inch in length, although thick in proportion. Dr. Gadow observes that the tongue is frequently small in birds which have the bill, mouth, and gullet very large ("Dictionary of Birds," p. 974), and such is the case with *Sula*. Neither is it likely to be of any assistance for tasting purposes, or for voice, yet it may have unknown functions connected with the swallowing of fish. To my mind, the most remarkable thing about a Gannet's tongue is its raised position, to which



THE POSITION OF A GANNET'S TONGUE.

attention has been drawn by Mr. Maynard (*t.c.*, p. 116), and which is clearly shown by Mr. Wilson in his drawing, made from a fresh subject. Mr. Maynard thinks that the tongue of a Gannet is probably retractable, the hyoid bones being long, and surrounded with muscles.*

The Eyes.—The eye-ball of a Gannet is larger than the eye-lid aperture would lead us to expect. That which may be called the external eye has a circumference of 3.2 inches, and its position is remarkable. It is so set in the head as to look forwards, and forwards only; accordingly the Gannet, unlike most birds, can see an object with both eyes at once.†

But this is only true of an adult Gannet, for in a young one, six months old or so, the supra-occipital bone has not yet acquired its ultimate shape. Nevertheless young Gannets commence plunging early (*see* p. 403), in fact, before they are four months old, at which age they could not see a fish with both eyes simultaneously.

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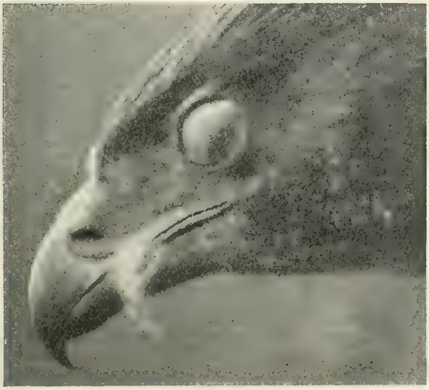
* In the Darter (*Plotus*) the tongue is practically obsolete (*see* illustration in Beddard's "Structure and Classification of Birds," p. 20). In *Pelecanus* it is even more raised than in *Sula*, but scarcely any larger, *cf.* Nitzsch-Giebel, "Die Zunge des Vögel."

† The position of a Gannet's eyes is not dissimilar to that of Owls, which drop on their prey, but not head foremost. Terns and Kingfishers, however, which are plunging birds, and dive into the water from a height very like a Gannet, have their eyes located on the sides of the head.

There is one aid which the Gannet has, which must be a great protection every time it strikes the water, viz a strong nictitating membrane. This membrane, which springs as in other birds, from the corner of the eye nearest to the beak, is moved by two muscles. It can be drawn to and fro, and is evidently transparent, or partially so.*

Besides this, the muscles around the eye must be very powerful, for when handling a live Gannet, I have observed them to expand and contract enough to raise the skin perceptibly.

The Brain.—Professor Newton has stated his opinion that accurate weights and measurements of birds' brains might help in deciding precedency in classification ("Dictionary of Birds," Introd., p. 116), but at present this central part of the nervous system has not been studied



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* A photograph of a living Golden Eagle by Mr. Seton Gordon, so well shows the way in which the eye is completely covered by this membrane, that I am tempted to reproduce it. For a proper description of this organ *see* Newton and Gadow's "Dictionary of Birds," p. 233.

sufficiently to be so used. With his assistance the brain of an adult Gannet was carefully extracted from a head sent by me to the Cambridge Physiological Laboratory, and found to weigh 19.4 gramms. In proportion to the weight of the body this must be low as compared with the brains of the *Corvidæ*, and many other birds. As already stated, the cavity in a Gannet's skull is not large, and in some respects the Gannet appears to be rather lacking in intelligence; yet it is difficult to measure the intelligence of any animal by a human standard.

The Ears.—The ears of a Gannet are remarkably small, and closely covered with feathers—another provision to keep the water out. The orifice, which is nearly round, measures externally .09, but the passage increases in width as it goes further in. Small as the orifice is, a Gannet can still further contract it, as I have observed when holding a live one, and this power of contraction is most likely exercised in the act of plunging.*

The Oil-gland.—The oil-gland or uropygium, situated on the lower part of the back, is thickly covered with feathers, and very flat. It consists of two glandular receptacles, united in one, but presenting distinct orifices, and Mr. Ticehurst considers it of the largest proportional size amongst birds. This structure, which is special to birds, is not used for lubrication of plumage by the Gannet, as far as I could judge, whatever its function may be.

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* The ear of a Cormorant is equally small.

The Muscles, Reproductive Organs, etc.—The muscular system, the reproductive organs, the heart and lungs, do not call for any special description, although to a well-trained anatomist they would probably present a few peculiarities; but Macgillivray has nothing to say about them.

The ambiens muscle, which runs along the inner side of the leg, and which for a time was thought of so much importance, exists in the Gannet, and, in fact, in all the *Steganopodes*.

APPENDIX A.

GANNETS CLOSELY ALLIED TO *SULA BASSANA*.

When the present monograph was commenced it was only intended to relate to *Sula bassana*, but it would hardly be a fitting conclusion to leave off without some mention of its allies of the Southern Hemisphere, *S. capensis* and *S. serrator*. I have never seen these species in a state of nature, but they have both been on view in the gardens of the Zoological Society (London), where they have been kept on the Gull-pond. The best marked distinction between the three Gannets is to be found less in their plumage than in their geographical distribution. This can be defined with unusual clearness, and is here shown in a map by three different kinds of shading. It will be noted that these Gannets are natives of widely separated portions of the globe, yet they inhabit corresponding zones of latitude. It is true that the Boobies form a link, but even they can hardly be said to unite the chain. If *S. bassana*, *S. capensis*, and *S. serrator* all sprang from a common ancestor, were the intervals between them once bridged over? Of the six Zoo-geographical Regions of the earth, they now inhabit three. Cases of such interrupted distribution are not uncommon among birds, but they are not easily accounted for. The differences between *Sula capensis*, *S. serrator*, and *S. bassana* may be stated concisely in parallel columns.

Sula capensis.	*Sula serrator.*	*Sula bassana.*
Length, 35 inches. Length of bare skin on throat, 3 to 6 inches. Crown and nape of neck pale yellow, rather more pronounced than in *S. bassana.* Tail-feathers black. When in change of plumage, *i.e.*, at the age of about fifteen months, the dark feathers on the under-parts are lighter, and more freckled than in *S. bassana.* Illustration, "The Fauna of South Africa" Vol. IV., Plate 6.	Length, 34 inches. Length of bare skin on throat 4 to 8 inches. Crown and nape of neck yellow, more pronounced than in *S. bassana.* From four to six of the tail-feathers black. Secondary-feathers of the wing black. Young birds have larger white spots on the wing than in the young of *S. bassana,* and the breast and belly also turn white sooner. Illustration, Gould's "Birds of Australia," Vol. VI., Plate 76.	Length, 37 inches. Length of bare skin on throat 3 to 4 inches. Crown and nape of neck pale yellow. All the tail-feathers white. Young birds described on p. 478. Illustration, "Rough Notes on Birds," by E. T. Booth, Vol. III., Plates I.-VI.

SULA CAPENSIS.

Sula capensis, Licht.

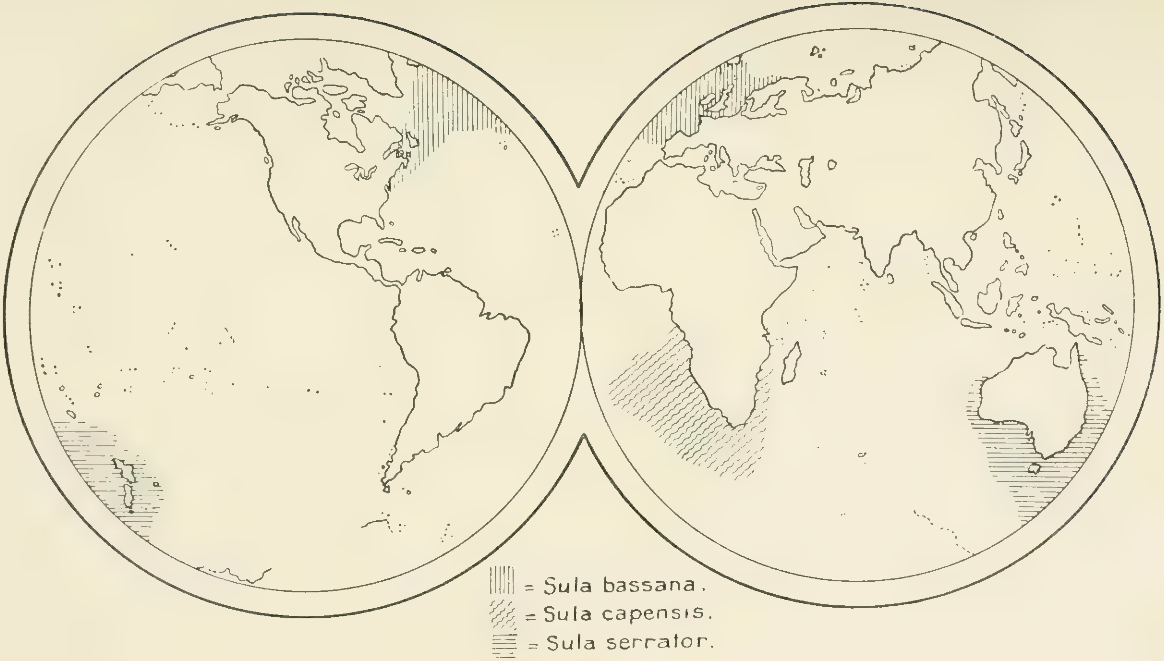
(No synonyms.)

The Black-tailed Gannet.

Malagash.

Dutch name: Kaapse Stommerik. For a list of references, *see* "Catalogue of Birds in the British Museum," XXVI., p. 429.

The Black-tailed Gannet of South Africa must be very abundant along the shores of Cape Colony, but its distribution goes far south of that, for the Antarctic expedition of 1898–1900 met with it in latitude 44° 3′. Northward it travels up the coast to Loango and the French Congo on the west of Africa, and Gannets with black tails, which may have been *S. capensis,* have even been seen off the Canaries (Meade-Waldo, "Ibis,"



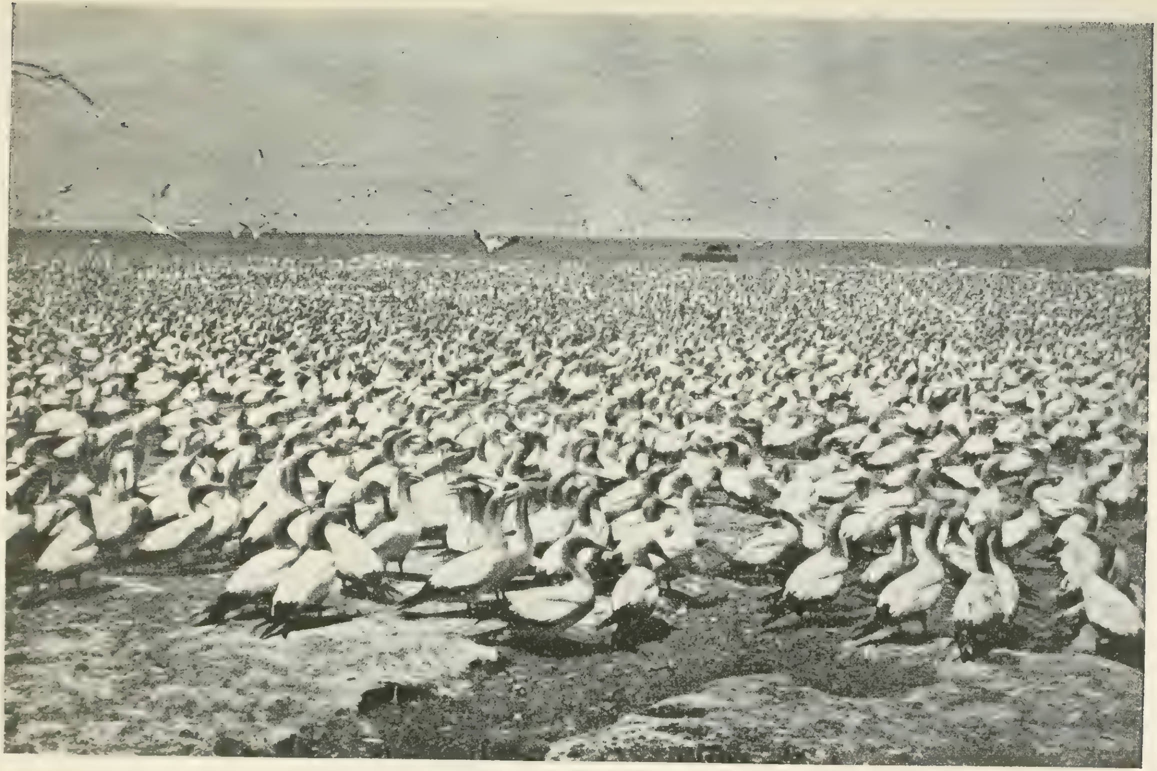
▥ = Sula bassana.
▨ = Sula capensis.
▤ = Sula serrator.

1889, p. 508), but on the east side, where it has no breeding place, it has not been met with so far to the north. Throughout this region it appears to be known as the "Malagash," or "Malaga," a name principally used by seafaring men, but of which neither Mr. W. L. Sclater nor Mr. D. A. Bannerman knows the meaning. The word may be connected with the Portuguese *Mergulhar*=to dip.

All the known breeding places of the "Malagash" are on islands, and as they are protected, the birds have probably increased largely in numbers. What is possibly the largest of these Gannet "Guano Preserves" exists on Bird Island, in Algoa Bay, and this is also the most eastern. Here, writes Mr. H. E. Harris, who visited the island in 1900, they are so numerous as to cover an acre and a half of sand, each one squatting on its single egg, which it covers with its foot. The excellent photograph by Mr. Harris takes in the greater part of this area, and is copied by permission from "Birds of the Canary Islands and South Africa" (1901). Although there must be more Gannets here than at the Bass Rock, Mr. Harris remarks incidentally that the spectacle is not so imposing, owing to the flatness of the island.

I have also to acknowledge a striking photograph of Bird Island by Mr. R. Jackson (received through Mr. Harvie-Brown); this was taken later than Mr. Harris's, but it shows the sand equally crowded with great numbers of Gannets. I learn from Mr. F. W. Fitz-Simons that the Gannets are divided into two great companies.

Some other breeding-places of *S. capensis* on the west coast are cited in the "Fauna of South Africa," namely Hollam's Bird-island, Ichabo, of which an account is given by Mr. W. P. Lowe ("Ibis," 1912, p. 263)—Possession Island and Halifax Island off Namaqualand—and Malagash Island at the



SULA CAPENSIS ON BIRD ISLAND. [*H. E. Harris, Phot.*

entrance to Saldanha Bay (Cape Colony), where Mr. W. L. Sclater met with countless numbers, sitting so close as to be in many cases almost touching one another ("Ibis," 1904, p. 84).

S. capensis is a valuable depositor of guano, which is the reason why in company with the Penguins it meets with protection. Some extraordinary particulars have been collected by Mr. Sclater (*see* "Ibis," 1904, p. 87), from which it appears that in one year alone—1902—the Gannets on Bird Island furnished 197 tons of guano, while in Saldanha Bay no less than 688 tons were collected, besides a great deal more from the Gannet-stations on Ichabo and Possession Island.

SULA SERRATOR.

Sula serrator, Gray.

S. australis, Gould.

S. bassana serrator, Mathews.

S. plumigula, Pelzeln.

The Australian Gannet.

Native name: Takapu.

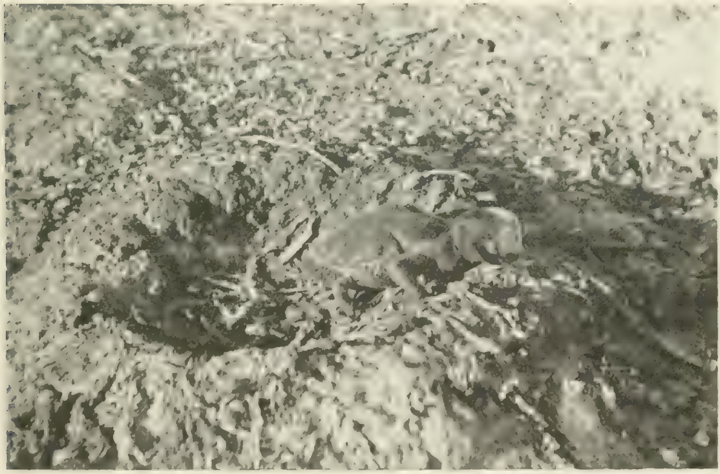
For references, *see* "Catalogue of Birds in the British Museum," XXVI., p. 428.

It is necessary to adopt G. R. Gray's name of *Sula serrator* ("Voy. 'Erebus and Terror,'" Birds, p. 19 (1845)), for this species, because the name of *Sula australis*—which was originally suggested in Sir Joseph Banks's Icon. ined. 30, by Forster (?)—had been already made use of by Mr. J. F. Stephens in his continuation of Shaw's "General Zoology" in 1825 (VIII., Part I., p. 104) for *Sula sula* (*S. leucogastra*, B.).

In "The Birds of New Zealand" (Supplement, p. 46) Sir W. Buller has given an account of a breeding station of *Sula serrator* at Cape Kidnappers. Some particulars of its nesting

[*A. H. Mattingley, Phot.*

SULA SERRATOR ON CAT ISLAND.



[*A. H. Mattingley, Phot.*

NESTLING OF SULA SERRATOR.

are also furnished by Mr. D. le Souëf in " The Victorian Naturalist " (1901–2, p. 181), and by Mr. A. H. Mattingley in the same journal (1908, p. 12). Mr. Mattingley, who spent several nights sitting up in an Australian Gannetry, states that the nestling *S. serrator*, when quite young (apparently about five days old from the photograph) and devoid of feathers, crawls about on all fours, using legs, wings, and beak as aids to progression. Subsequently adding some further particulars in a letter, he says : " *Sula serrator* only lays one egg, but one often finds addled eggs that have been thrown out of the nest. Some I have found intact buried under the guano forming a nest ; these nests were evidently a second attempt at brooding after a first failure . . ." Its habit of covering its egg with its foot has been already referred to (p. 352). Mr. Mattingley has obliged me with a series of excellent photographs, two of which, taken on Cat Island, Bass Strait, are here reproduced ; and I am also indebted to Mr. A. J. Campbell of Melbourne for a photograph from the same locality, which shows that Australian Gannets when sitting on their nests face different ways, a point about which there has been some discussion (*see* p. 101). In Mr. Campbell's " Nests and Eggs of Australian Birds," 1901 (II., p. 981), there is a good account of *S. serrator*, which evidently closely resembles *S. bassana* in its habits.

APPENDIX B.

THE BOOBIES, OR TROPICAL GANNETS.

Very nearly allied to the Gannets just named are the Boobies of the tropical seas. In fact in the opinion of most classifiers, including Mr. W. R. Ogilvie-Grant, Dr. E. Hartert, and the late Prof. Newton, they are not generically separable ; but this was not the view taken by Dr. R. B. Sharpe ("Handbook to the Birds of Great Britain," II., p. 218). The Boobies are smaller birds than *S. bassana*, *S. capensis*, and *S. serrator*, and otherwise differ from them; generally they breed on low trees, laying either one or two eggs, and none of them has a strip of bare skin in the front of the neck. There are from seven to ten sorts of these Boobies, according to the views which different ornithologists hold, certain characters being held by some authors to be specific, by others not.

1.

Sula dactylatra, Lesson ; *S. cyanops* (Sundevall) ; *S. abbotti.* The Masked Booby.

Tropical Seas. Breeds on Ascension Island, where Mandelso caught some in 1639 ("Voyage 'Perse,'" *livre troisième*), and from whence I have photographs. General colour white, excepting the wing- and tail-feathers.

2.

Sula piscator piscator (Linnæus); *S. p. coryi*, Maynard. The Red-footed Booby.

Tropical seas. General colour white.

The accompanying photograph was taken by Mr. Meade-Waldo on South Trinidad in January, 1906.

3.

Sula p. websteri, Rothschild.

Galapágos Islands.

General colour white. Distinguishable from *S. p. piscator* by its dark brownish-grey tail (*see* "Novitates Zool.," 1899, p. 177 and 1902, p. 406).

4.

Sula variegata variegata (Tschudi); Chili and Peru.

General colour white; plumage spotted in the young.

5.

Sula v. granti, Rothschild; Galapágos Islands ("Bull. Brit. Orn. Cl.," XIII., 1902–3, p. 7).

Plumage spotted in the young.

6.

Sula nebouxi, Milne-Edwards; *S. gossi*. The Blue-footed Booby. The Pacific coast of America.

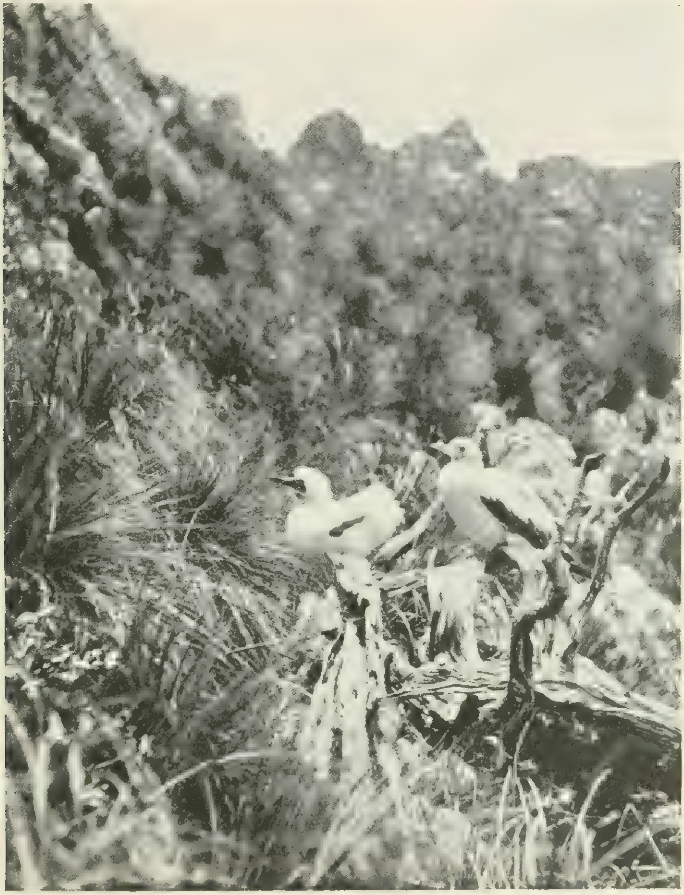
General colour brown ("Cat. of Birds," XXVI., p. 435).

7.

Sula leucogastra (Boddaert); *S. sula* (Vieill.); *S. fiber*. The Brown Booby.

Tropical seas. At Cape Verde ("Hakluyt's Voyages," ed. 1599, II., part 2, p. 44 *et seq.*); on the coast of Brazil, 1604

("Purchas' Pilgrimes," 1625, 1 book, III., p. 132); at Dunkirk ("Bull. Soc. Zool. de France," 1889, p. 106).



[*E. Meade-Waldo, Phot.*

SULA PISCATOR.

Plumage of the adult sooty-brown, with white breast and belly.

8.

Sula etesiaca, Thayer and Bangs.

Western coast of Columbia and Panama ("Bull. Mus. Comp., Zool.," XLVI. (1905), p. 92).

General colour brown.

9.

Sula brewsteri, Goss; *S. nesiotis,* Heller and Snodgr.

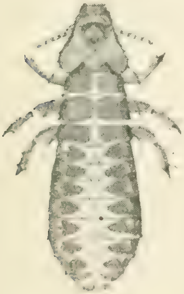
Pacific coast of America.

General colour brown, head and throat white.

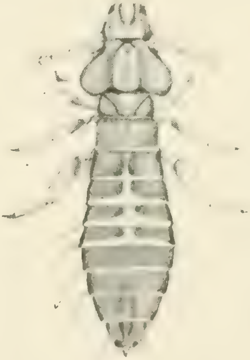
APPENDIX C.

THE PARASITES INFESTING GANNETS.

Bird-lice or Biting-lice.—These Ectoparasites are small insects of the Order *Neuroptera*, Sub-order *Mallophaga*, which exist on, and derive nourishment from the feathers and skin of living birds. They are wingless, and differ from ordinary lice in the structure of the mouth, which is formed for biting. Gannets are largely infested with *Mallophaga*, and as might be expected these parasites are by no means confined to the British Gannet. The African *Sula capensis*, the Australian *S. serrator*, and probably all the tropical Boobies, harbour parasites of this Sub-order. Of some of these mention is made in "Les Pédiculines," by E. Piaget (1880-5). In this comprehensive



DOCOPHORUS BASSANÆ ♀.



LIPEURUS PULLATUS ♂.

work M. Piaget has described three species of *Mallophaga* from *S. serrator*, and four from *S. leucogastra* (Brown Booby) (Vol. I., pp. 108, 337, 339, and 490). He also enumerates, and figures, four species from *S. bassana*, to which he assigns the following names :—

Docophorus lari, Denny [Plate IX., Fig. 7].
Docophorus bassanæ, Denny [Plate X., Fig. 6].
Lipeurus pullatus, Nitzsch (= *L. staphylinoides*, D.) [Plate XXVII., Fig. 9].
Menopon pustulosum, N. [Plate XLI., Fig. 3].

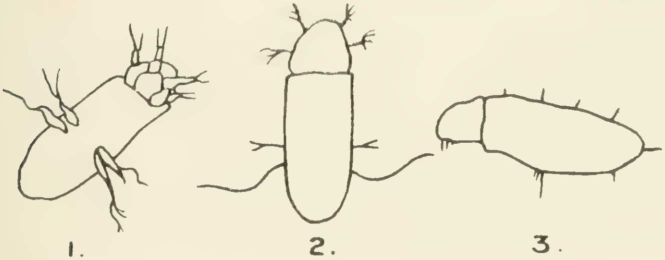
Mr. William Evans, of Edinburgh, whose researches are still more recent, and who has afforded me the greatest assistance in a subject of which I am very ignorant, is of opinion that Denny's *Docophorus bassanæ* is the female of his *Lipeurus staphylinoides* (*L. pullatus*, N.). *See* his paper in "Proc. R. Phys. Soc. of Edinburgh" (1912, p. 273).

All the *Mallophaga* which Mr. Evans has so far obtained from Gannets have been referable to these two forms, for the *Lipeurus* which he recorded from St. Kilda in the "Annals of Scottish Nat. Hist." (1906, p. 87), proved not to be a Gannet species, but to be *L. mutabilis* from the Fulmar Petrel.

Gannet's subcutaneous Acarid.—Quite distinct from these insects, or *Mallophaga*, is the Singular Mite or Acarid, which is to be sometimes found in the subcutaneous cells of the Gannet. This little creature, which was first brought under the notice of naturalists by George Montagu, who described it in "The Memoirs of The Wernerian Nat. Hist. Soc.," (1809, I., p. 191), is worthy of more study than it has yet received. It may easily be overlooked, owing to its small size and pale colour, and it certainly is not of universal occurrence.

It was some time before I succeeded in meeting with an example, but Mr. W. A. Tulloch, when stationed at Ailsa Craig lighthouse, secured several, and Montagu seems to have found it in every Gannet which he dissected.

Montagu describes it as "ovate-oblong, smooth, glossy, white, with eight short legs furnished with several joints and terminated by bristles; two on each side approximating and near to the anterior end: the others similarly disposed about one-third of its length from the posterior-end; of the posterior legs the hindmost pair is furnished with a very long bristle, the other pair usually with two; the anterior legs possess several bristles each." The mouth was not discernible, nor the eyes, nor any other appendages. A copy of his figure is here given, showing the under (1), upper (2), and side view (3), all greatly magnified.



Under the title of "What is the *Cellularia bassani* of Montagu?" Mr. W. Evans has a short article on this Acarid in "The Scottish Naturalist" (1912, p. 68), in which he points out that the name *Cellularia* is inadmissible, being pre-occupied in marine Polyzoa. "An organism," continues Mr. Evans, "very similar to Montagu's, known as *Hypoderas*, or *Hypodectes columbæ*, from the domestic pigeon, has been studied by C. Robertson ('Quart. Journ. Micr. Soc.,' 1866, p. 201), Mégnin ('Journ. Anat. et Physiol.,' 1877 and 1879) and others. Robertson alludes to the close resemblance of Montagu's *Cellularia bassani* to this, and anyone who compares the figures of the two must be struck by their similarity. Mégnin found *Hypodectes columbæ* to be a hypopial stage of an Analgesid or Bird mite *Pterolichus* (now *Falculifer*) *rostratus*, Buchholz. Now, the only Analgesid that appears to have been recorded from the Gannet is *Freyana* (subgen. *Michaelia*) *caput-medusæ* Trouessart (*see* new edition of Naumann's 'Naturgeschichte der Vögel Mitteleuropas,' and Canestrini's 'Sarcoptidæ' in 'Das Tierreich'). It seems, therefore, highly probable that Montagu's *Cellularia bassani*—a name which, by the way, one looks for in vain in Canestrini's work—is a hypopial stage of this mite."

If this be so, it will in future stand as *Freyana bassani* (Mont.), I presume.

Mr. Evans suggests that the best time to look for the hypopus would be the Gannet's moulting-season, as he thinks this subcutaneous stage of the mite may perhaps be a provision against its being thrown off with the feathers.

An Acarid has also been found in the subcutaneous air-cells of the Black-tailed Gannet, *Sula capensis* (*see* Sclater and Stark, "Birds of South Africa," Vol. IV., p. 775), and it is almost certain that the Australian Gannet, *S. serrator*, has one also, but whether they are identical with the Acarids which infest *S. bassana* remains to be proved by some specialist.

Mr. Evans further informs me that Canestrini and Kramer in their "Sarcoptidæ" mention two other Bird mites as found on the Tropical Gannets, namely *Pteronyssus circiniger* Trt., found on *Sula fiber*, the Brown Booby, from the Philippines; and *Nealges poppei*, Trt., on *Sula piscator*, the Red-footed Booby, from New Zealand.

Ixodes or Tick.—Mr. Evans has also recently found a formidable Tick, *Ixodes putus*, Cambridge (= *I. borealis*, K. and N.) on a Gannet from the Bass Rock, of which he has given an enlarged figure from a St. Kilda specimen, by which the creature may be recognised ("Annals of Scottish Natural History," 1906, p. 85).

APPENDIX D.

HISTORIC AND PRE-HISTORIC REMAINS OF GANNETS.

Remains of Gannets cotemporary with the Picts.—In 1901-2 the cranium and coracoid bone of a Gannet were dug up with many other remains outside a Pict's dwelling in Orkney, and subsequently identified by Mr. N. F. Ticehurst ("British Birds" Magazine, 1907-8, p. 309). The date approximately assigned to them is the ninth century. In 1864 Gannet remains were met with in a kitchenmidden at Keiss in Caithness (*see* "Pre-historic Remains of Caithness," by Samuel Laing, 1866). They were considered to be comparatively recent, and to belong to the late period of the "Broch" or Pict habitation near which they were found, *i.e.*, approximately the ninth century.

Gannet bones, subsequently identified as such by Professor Newton, were also obtained on the north coast of Antrim, Ireland, some fifty miles only from Ailsa Craig ("The Irish Naturalist," 1899, p. 5). As was the case in Orkney and Caithness, they were associated with the remains of *Alca impennis*, and are not likely to be of any antiquity: men of the eighth or ninth century may have brought them in boats from Ailsa Craig for food.

Remains of Gannets from the Stone Age.—To the later Stone Age, or perhaps to what is accepted as the Bronze Age, belong the only remains of Gannets which up to the present have been identified in England. These were discovered in an old sea-cave (140 feet above the present sea-level) at Whitburn, on the coast of Durham, to which they had evidently been brought by man—together with bones of the Great Auk, Razorbill, and various mammals (R. Howse, "Nat. Hist. Trans., Northumberland and Durham," 1880, p. 361).

In Denmark Dr. Herluf Winge enumerates the following places where bones of Gannets have been found ("*Orn. jordfundne Fugle fra Danmark*," sartryk orf Vidensk. meddel. fra den Naturh. Foren. 1 Kbk, 1903) : Fannerup near Meilgaard, Erteb*ϕ*lle, Hessel*ϕ*, in the southern Kattegat, Borrebjerg kitchenmiddens, Ordrup mose, *i.e.*, bog or moss of Ore Torp.

Dr. Winge gives a list of several other species of birds, which were also identified, in the same kitchenmiddens.

Dr. Winge considers the Gannet bones found at Fannerup and Erteb*ϕ*lle probably date from the older Stone Age (B.C. 4000-3000), while the bones from Hessel*ϕ* date from the later Stone Age. To those found at Borrebjerg he would not assign an earlier date than *cir.* B.C. 400-300.

Since his Report was published more Gannet-bones have been found at Kassemose in Seeland.

In Norway also Gannet bones have been found in a great kitchenmidden of the Stone Age at Viste, Jæderen, as recorded by Dr. Winge ("Vistefundet en œldre stenalders Kj*ϕ*kkenm*ϕ*dding fra jæderen," av A. W. Br*ϕ*gger).

APPENDIX E.

TERTIARY FOSSILS OF *SULA*.

Remains from the Miocene Deposit.—It is clear from the discoveries which have been made in the Miocene of the Tertiary Epoch, that many birds existed in Europe at that period, which were nearly allied to those of the present day. Among the bones indistinguishable from those of existing genera, are some attributable to *Sula*.

In the United States *Sula loxostyla* was described by Mr. E. D. Cope from a coracoid found in Maryland ("Trans. American Philosophical Society," XIV. (1870), p. 236).

In France, where a good many fossils of birds seem to have been dug up (*see* "Revue Française d'Ornithologie," 1912, p. 283), Professor A. Milne-Edwards in 1867 described and figured a pelvis from the Lower Miocene, under the name of *Sula arvernansis* ("Oiseaux Fossiles de la France," Vol. I., p. 267, and Plate XLIII., Fig. 12).

He also referred to the same genus (*l.c.*, p. 271, Plate XLIV., Fig. 9) a pelvis which had been previously described by Professor Gervais as *Mergus ronzoni* ("Mem. de l'Acad. de Sc. de Montpellier," Vol. I., p. 270, and "Pal. Franc.," 2nd edition, p. 412.) In 1874 Milne-Edwards further described *Sula pygmæa* from bones found in Gironde ("Bibl. des Hautes-Etudes," VI., Art. V.).

FINIS.

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